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CORNELL BULLETIN FOR HOMEMAKERS

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HOME CANNING

MARION C. PFUND

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Carelessness that may lead to spoilage

(For a complete discussion of spoilage, see page 7)

Poor products or good products badly handled:

Stale, unsound, or overmature products.
Allowing products to remain too long in closed containers or in warm places before being canned.
Canning too much material at one time.
Packing the container too tightly, especially with such products as lima beans, corn, greens, and peas.
Delaying overlong between the steps in canning.
Filling the containers with warm instead of boiling liquid.
Not processing the containers as soon as they are ready for the processing kettle.

Imperfect seal:

Not testing jars and lids for leaks before using.
Using poor rubbers, old rubbers, or two rubbers on one jar.
Leaving particles of food or grease on the sealing surfaces.
Snapping the wire bail so that it presses against the rubber ring.
Failing to hold the lid steady while adjusting the screw band.
Lifting the jars by the tops or carelessly inverting the jars while they are still hot after processing.
Moving the jar lids after the jars have cooled.

Inadequate heat:

Preventing heat from adequate penetration because of too light or too full pack, especially with beans, corn, greens, peas, pumpkin, and squash.
Processing too short a period.
Not having the boiling-water bath boiling when the containers are put in the bath.
Beginning to count the processing time before the water has come to a boil again after the containers have been added.
Not keeping the water in the boiling-water bath boiling steadily throughout processing.
Not processing vegetables, meats, poultry, and fish in a pressure cooker.
Not driving all the air out of a pressure cooker (7 minutes) before closing the pet cock.
Beginning to count the processing time in a pressure cooker before the pressure gauge registers the necessary pressure.
Allowing the pressure to fluctuate and not increasing the time because of the fluctuation.

Improper treatment after processing:

Cooling jars too slowly.
Storing jars before they are cold.
Storing jars in too warm a place; near steam pipes, furnaces, and the like.

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HOME CANNING[1]

MARION C. PFUND

Eat and enjoy fresh fruits and vegetables in quantity while they are at their best. Preserve surplus food while it is in prime condition. Canning is only one method of preservation. The aim of any method of food preservation is to keep first-class food in good condition from in-season to out-of-season, from a time of plenty and abundance to a time of scarcity and need. A small garden may provide vegetables for the year at a low cost. If you have no garden and live near a big market, use judgment in buying food for canning. Fully ripe fruit in prime condition gives the best canned product. If such fruit is obtainable at a reasonable price, it may be an economy to buy and can it. Vegetables, however, must be immature and canned within a few hours after harvesting in order to yield a good-quality canned product. Possibly it is cheaper to buy fresh vegetables during the winter than to can vegetables during the summer for winter use. The fresh vegetables may be of a better quality than the day-old products canned during the summer.

METHODS OF PRESERVATION

Select with care and thought the method of preservation which you will use. Store, freeze, dry, evaporate, cure and smoke, pickle and salt, or can your product only after carefully considering the most economical method from the points of view of the best product obtainable, the cost, the space necessary for storage, and the time and labor involved.

Storage

Store fruits and vegetables that can be stored satisfactorily. Fresh products will thus be available for out-of-season use, the purchase of containers will be unnecessary, and a comparatively small amount of time and labor will be required. Beans, beets, cabbage, carrots, celery, onions, parsnips, pumpkin, potatoes, rutabagas, salsify, squash, sweet potatoes, turnips, and apples may be stored satisfactorily under proper conditions. These conditions are: (1) a good-quality product harvested at the proper stage of maturity and (2) an adequate storage space kept at the proper temperature and humidity.[2] Make an attempt to meet these conditions before considering drying or canning vegetables.

[1]The New York State College of Home Economics wishes to acknowledge the assistance given by Professors A. J. Heinicke, C. B. Raymond, C. N. Stark, and H. C. Thompson, of the New York State College of Agriculture.

[2]Refer to Farmers' Bulletin 879, of the United States Department of Agriculture, *Home Storage of Vegetables*, by James H. Beattie. 1939.

Freezing

Although the home freezing of fruits, vegetables, and meats is still in the early stages of development, the method is expected to offer ever-increasing opportunities. Consider the advisability of freezing and the availability of freezing cabinets and locker plants before using more time-consuming methods of preservation.[3]

Drying and evaporating

Dry or evaporate fruits and vegetables only (1) if storage is not possible, (2) if money is not available for suitable canning equipment, and (3) if there is a cheap source of heat. Drying has several advantages: the weight of the product is from one-fourth to one-tenth that of the fresh material, bulk is reduced, the containers are relatively inexpensive, and no especially prepared storage room need be provided. The greatest disadvantages are that the drying process requires much space and frequent attention, and the dried products require soaking or long cooking before they are ready to be eaten. Berries, cherries, pears, peaches, plums, prunes, and quinces are the fruits, and corn, peas, peppers, snap beans, and spinach are the vegetables that may most successfully be dried. If storage is not practicable, apples, beets, cabbage, carrots, celery, onions, parsnips, potatoes, pumpkin, squash, sweet potatoes, and turnips also can be dried.[4]

Curing, brining, and preserving

Cure and smoke the meat that cannot conveniently be used fresh or canned.[5] Pickle and salt some foods, such as cabbage, cauliflower, beans, and corn, for variety in the menu.[6] Make marmalades, conserves, jams, and jellies in sufficient quantity to last the family for the year.[7]

Canning

Can those fruits which cannot be stored. Can fruit juice for beverages when there is an abundance of fruit, and for jelly if the jelly cannot be made while the fruit is at its best for jelly-making. Since all fruits and tomatoes are easy to can, because of the acid present, only the simplest

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[3]Refer to New York State (Geneva) Experiment Station Bulletin 690, *Freezing and Storage of Foods in Freezing Cabinets and Locker Plants*, by D. K. Tressler and C. W. DuBois, 1940, and to Circular 107, of the Farm Credit Administration, Washington, D. C., *Refrigerated Food Lockers*, by L. B. Mann. 1938.

[4]Refer to Farmers' Bulletin 984, of the United States Department of Agriculture, *Farm and Home Drying of Fruits and Vegetables*, by Joseph S. Caldwell. 1933.

[5]Refer to Cornell Extension Bulletin 241, *Curing Meat*, by R. B. Hinman, C. D. Schutt, and H. A. Holley. Revised 1940.

[6]Refer to Cornell Extension Bulletin 294, *Pickles and Relishes*, by Marion C. Pfund. Revised 1940.

[7]Refer to Cornell Extension Bulletin 267, *Jellies, Preserves, and Fruit Juices*, by Jessie A. Boys and Faith Fenton. 1933.

equipment is necessary. If you have, or can obtain, a pressure cooker, can also those vegetables that cannot be stored; but if you have neither storage space nor a pressure cooker, dry vegetables rather than can them. Dried corn, for example, is delicious, while corn canned without the use of a pressure cooker may spoil. It is much safer to dry than to can all over-mature vegetables. If you are on a farm, can meat and chicken during the killing season only if you have a pressure cooker; otherwise, cure and smoke meat, for there will be less loss from spoilage if this method is used than if the meat is canned by the boiling-water-bath method.

SPOILAGE

Prevention

Successful canning prevents spoilage (1) by establishing conditions whereby it is impossible for the food to come in contact with anything which might cause spoilage, and (2) by destroying everything already on the food which might cause it to spoil. These are accomplished by packing the food in a suitable container, applying sufficient heat to destroy any and all spoilage agents present, making the container air-tight, and storing under proper conditions. If canned food has been properly packed, heated, sealed, and stored, it will keep indefinitely without spoilage. Canning powders and preservatives should never be used, as they are not necessary, and they may be harmful. The use of vinegar or lemon juice, formerly recommended in the canning of vegetables by the hot-water-bath method, is not advised because the method is not dependable and the flavor of the product is frequently unsatisfactory.

Agents

The spoilage of canned food is caused either by the growth of microorganisms known as *molds, yeasts,* and *bacteria,* or by chemical agents. Some microorganisms are found almost everywhere: in the air, in the soil, and on the surface of food. It is the failure to kill these organisms or to prevent their contact with food which causes all microbial spoilage. It is important, therefore, to recognize the kinds, causes, and dangers of spoilage, and to understand how spoilage can be prevented.

Molds

The familiar fuzzy growth produced by molds is easily recognizable. Molds usually begin their growth upon the surface of the canned food and penetrate slowly to the center. If the mold is present in small amounts, it may be removed from the surface, and the remainder of the

food may be eaten with safety, as there is little evidence that moldy food causes illness. If a heavy growth of mold is present, however, the food should be discarded, as the flavor and the texture will be unfavorably affected.

Molds require air; they grow rapidly in warm, dark places, and in the presence of sugar, acid, and moisture. For this reason, jellies, preserves, fruit juices, and tomatoes are likely to be affected. Acid foods, such as fruits, when canned with a large amount of sugar, are particularly susceptible. Although molds are easily destroyed by heating for a short time at the temperature of boiling water, and sometimes even at a lower temperature if the heat is continued for a sufficiently long time, spoilage may take place if the food is heated in an open kettle, transferred to hot jars, sealed, and stored. The molds from the air may contaminate the food as it is being transferred or the molds may be in the jars if they have not been properly sterilized. Molds will not spoil canned food if the jars containing the food are heated in a boiling-water bath long enough to kill the molds and are then adequately sealed.

Yeasts

Yeasts are the microorganisms which cause canned fruits and fruit products to ferment. Fermented products should be discarded; their food value is impaired and the natural taste of the food is destroyed. Usually the fruit has a fermented appearance, a sour taste, and a cheesy or alcoholic odor. One of the products of fermentation is carbon-dioxide gas. The gas accumulates and, even though there may be no outward sign of spoilage, there may be an outburst of gas or a spurt of liquid when the container is opened. If sufficient gas accumulates, it may break the seal of a glass jar so that the contents leak out, and occasionally a jar may "blow up." Spoilage of this kind in foods canned in tin causes the ends of the cans to round outward. The trade term for such cans is "swells." Any gas, however, will produce the same result, and the source of the gas is not always the carbon dioxide produced by yeasts.

Tomato products and fruit products may be spoiled by yeasts which grow in the presence of acid and sugar. Yeasts are destroyed, even more easily than are molds, by heating for a short time at the temperature of boiling water; they are more easily killed in unsweetened fruit juice than in juice containing a large amount of sugar. As with molds, yeasts may cause the spoilage of food if it is heated in an open kettle, transferred to hot jars, sealed, and stored. There is no danger of fermentation, however, if the jars containing the food are heated in a boiling-water bath long enough to kill the yeasts and are then adequately sealed and stored.

Bacteria

Bacteria are the chief trouble makers in canning because they may exist in resistant forms, called *endospores*. These are not always destroyed at the temperature of boiling water and may later develop when the canned food is stored and may cause bacterial spoilage.

Bacteria are easily killed by heat in the presence of acid; therefore such acid foods as fruit products and tomatoes when canned by the boiling-water-bath method are not subject to bacterial spoilage. Non-acid foods, such as meat and vegetables other than tomatoes, however, may be heated in containers in a boiling-water bath for as long as six hours without destroying the spores of certain bacteria. The reason for spoilage can usually be traced either to inadequate heating, as (1) heating in a boiling-water bath, steamer, or oven (212°F. is about the highest temperature which the food reaches by these kinds of heating) instead of in a pressure cooker, (2) heating at too low a pressure when a pressure cooker is used, or (3) heating for too short a time; or to the absence of an air-tight seal. To prevent the spoilage of meats and non-acid vegetables, therefore, a pressure cooker must be used, since only in this way is a temperature obtainable which is sufficiently high to kill the spore forms of the bacteria (from 240° to 250°F.).

Bacterial spoilage causes a number of conditions which may result in cloudiness, mushiness, putrid and disagreeable odors, gases, acid, or other "off" flavors and toxins.

Cloudiness and mushiness

Cloudiness and mushiness alone do not necessarily indicate spoilage, but food with such an appearance should not be tasted until it has been boiled actively for 10 minutes. If an odor develops during boiling, the food should be discarded without tasting.

Putrefaction

Food which has begun to putrefy gives off a disagreeable odor. Discard any such food without tasting.

Gases and "swells"[8]

Certain bacteria produce gas which, like the gas from yeast, may cause: (1) the ends of tin cans to bulge, (2) containers to set free an explosive puff of gas or spurt of liquid when they are opened, (3) jars to leak, or (4) jars to "blow up." Food from such containers should be regarded with suspicion. If bacterial spoilage has taken place, the product has usually a sour or putrid odor and sometimes a foamy appearance. Discard without tasting any food showing such spoilage. If the food does not show spoilage, heat it; but if it then foams or has an unnatural odor or appearance of any kind,

[8]Refer to the discussion of toxins and botulism on page 10.

discard it without tasting. If the food neither looks nor smells unusual after it has been heated, boil it actively in an open vesesel for 10 minutes. It may then be tasted. If the food is wholesome, the swelling probably was due to overpacking and not to the forming of gases during spoilage. If fruit is canned in tin, the acid present may have acted on the tin to produce a harmless gas with no harmful effect on the product.

Acids and flat sour

Other bacteria produce acids which give the canned food a sour taste. No gas is formed, however; therefore the ends of the spoiled cans remain flat. There may be no evidence of spoilage until the container is opened; then the food usually has a sloppy appearance and a cloudy liquid, it may have an unpleasant odor, and it is sure to have a sour taste. Discard such food. Peas, asparagus, corn, lima beans, and snap beans are particularly susceptible to this type of spoilage. This spoilage is usually caused by thermophilic, or heat-loving, bacteria, which require heat for their development. Such spoilage can be reduced to a minimum by packing the food into the jars quickly, heating the jars promptly after they are packed, cooling them immediately and thoroughly after they have been heated, and storing them in a cool place.

Toxins and botulism

Some bacteria during their growth produce extremely poisonous substances called *toxins*. One of the most dangerous of the toxin-producing organisms is *Clostridium botulinum*, an organism found in the soil, which causes botulism, usually a fatal disease. Unfortunately, signs of spoilage which can be detected by casual observation are not always evident when the fatal toxin has been produced. Sometimes a gas is formed together with the toxin, so that "swells"[9] are produced. The food may have a dark or mushy appearance and a cheesy or putrid odor. Be sure to discard food showing evidence of such spoilage without tasting it, for one taste may prove fatal. The toxin is rare but may be present in other forms of bacterial spoilage. It has been found in home-canned meats, in soup mixtures, and in such non-acid vegetables as asparagus, corn, greens, peas, and snap beans which had been canned at the temperature of boiling water. Acid foods such as fruit products and tomatoes are not subject to this type of spoilage because the organism does not develop and produce its toxin in such an acid medium. The bacterium produces heat-resistant endospores which are harmless themselves, but which, if not destroyed during the heating period, develop in the cans during storage, and produce the poison. To insure the destruction of the spores, meat and non-acid vegetables must be canned in a pressure cooker, for this is the only method whereby a temperature high enough to kill the spores can be obtained. The canning of meats

[9]Refer to page 9.

and non-acid vegetables by methods other than the pressure-cooker method is unsafe and cannot be recommended. Preserve these foods by methods other than canning if pressure cooking is not possible.

Because of the danger of poisoning from toxins, the Bureau of Home Economics, at Washington, D. C.,[10] recommends that all home-canned vegetables be boiled before they are tasted. The treatment is, of course, applied only to food that appears wholesome; other food should be immediately discarded.

Chemical agents

Chemical changes may be of two kinds: (1) a reaction between the food and the material of which the container is made, and (2) enzyme action.

When fruit is canned in tin, the acid may attack the tin and produce hydrogen gas. Hydrogen "swells" may thus be formed. The food, although it may be bleached, will otherwise have a normal appearance and will be wholesome. When corn is canned in tin, discoloration may take place because of chemical action. In order to avoid this action as far as possible, can the product in glass or in the enamel-lined containers recommended by the manufacturer for that particular product.

The most noticeable effect of enzyme action is discoloration. If the food is in a glass jar, the top surface may be seen to become first brown and later black. Much discoloration will produce a food of very poor quality and, at best, the taste will be somewhat unfavorably affected. Discard the discolored portions. The remainder of the food may be used if no objectionable odor develops after it has been boiled for 10 minutes. The development of any foreign odor indicates that other spoilage has taken place, in which case the food should be discarded without being tasted.

The colder the storage place is, the less will be the chemical action; therefore, store canned products in a cool place.

Frozen canned foods

Freezing does not cause canned foods to spoil. Freezing, however, may break the seal of a glass jar or spread the seams of a tin can so that microorganisms can enter the container and cause spoilage of the food. For this reason if canned foods are accidentally frozen, they should be examined for leakage and bulging at once. If there is any evidence of either, the canned food should be used immediately or be kept frozen until it can be used.

Disposal of spoiled products

Discard, without tasting, all foods suspected of being spoiled. Since spoiled food may cause animals to become ill, bury it with lye, allowing

[10]Refer to Farmers' Bulletin 1762, page 17, of the United States Department of Agriculture, *Home Canning of Fruits, Vegetables, and Meat*, by Louise Stanley and Mabel C. Stienbarger. 1938.

one tablespoon of lye to each quart of spoiled food. Give the containers special attention as directed on page 28, step 4 *a* (2).

MODERN CANNING METHODS

Home canning began about 1860 when such products as fruits, tomatoes, and pickles were canned by what is known as the *open-kettle,* or *cooked-in-the-kettle, method.* The food was cooked in an open kettle, quickly transferred boiling hot to jars which were supposed to have been sterilized by being boiled in water, and then tightly sealed with sterilized rubbers and covers. Within the past thirty years, however, the open-kettle method has rapidly fallen into disuse for several reasons: more vitamin C is destroyed in the open-kettle method than in the processed-in-the-can method if the food is not precooked for a long time; loss by spoilage may be high with this method since it is difficult to keep the containers and food sterile during the process of transferring the food to the jars; when such fruits as berries are cooked in the open kettle and then transferred to containers, the fruit may break and become mushy; and aromatic fruit preserved in this way may lose much of its flavor. The open-kettle method was never satisfactory for meats and non-acid vegetables. It is now recommended only with modification for the general canning of fruit, except for fruit products such as jams, conserves, and marmalades, which have large quantities of sugar, and for products to which has been added a liberal amount of vinegar. Even for such products, however, it is desirable to heat the sealed can of hot food in a boiling-water bath for a few minutes. If fruit is precooked for a few minutes in hot sirup before it is transferred to the jars, a closer pack will be obtained and fewer jars will be used; this is a modification of the open-kettle method since the jars must be later processed in the hot-water bath.

"Processing" is the heating of containers of food at a temperature sufficiently high for a long enough time to insure the keeping of the canned food at a moderately cool temperature without spoilage. The food may be packed raw, partially cooked, or wholly cooked. If it is packed cold, the method is called *cold pack;* if it is cooked or partially cooked and packed hot, the method is called *hot pack.* During processing, the containers are wholly sealed if they are tin, and may be wholly or partially sealed if they are glass (page 21). All modern canning should be done by one of the cooked-in-the-can methods, since the best quality of canned product is obtained by its use. These methods are taking the place of the open-kettle method because spoilage is reduced to a minimum and the original flavor and appearance of the product is more nearly retained.

Select the processed-in-the-can method best suited to the product to be canned; that is, the one which yields the best flavored and textured product

and insures the least loss by spoilage. In the prevention of spoilage, adequate heat, as has already been emphasized, is most important. What constitutes adequate heat, however, depends upon both the product itself and the size and the kind of the container. For example, adequate heat for grape juice is inadequate for tomatoes, whereas adequate heat for tomatoes is not nearly enough for meat. Also, two-quart containers require a longer heating period than do half-pint ones, while tin cans require less time for the heat to penetrate than do glass jars. To obtain the best quality product, only enough heat to prevent spoilage should be applied, as too much heat yields overcooked products of poor flavor, color, and texture. The following information will be helpful in selecting the best method for each product.

Pasteurization

Pasteurization is the heating of food at a temperature below the boiling point of water for a time long enough to destroy spoilage organisms; it is recommended for fruit juices only. They keep well after such processing, and the flavor is more nearly like that of fresh fruit juice than when the juice is boiled. The method is not recommended for any other product because of the danger of loss by spoilage.

To pasteurize, filled sealed containers are placed in a water bath which is kept at a temperature of from 165°F. to 180°F. for the length of time necessary for the product and the container used. If no thermometer is available, the fruit juice should be heated over water or, if this is impossible, the liquid in the processing kettle should be kept at the simmering point, which is the point at which bubbles occasionally rise to the surface.

Boiling-water bath, steamer, and oven

Boiling-water bath

The boiling-water bath is recommended for fruits, tomatoes, and rhubarb, and is not recommended for non-acid vegetables and meats. In the boiling-water-bath method, the partially or completely sealed jars or the completely sealed cans are plunged into an actively boiling-water bath deep enough to cover them completely. The addition of the containers cools the water to below the boiling point; it should be brought to an active boil again as quickly as possible. The containers are then processed in the actively boiling water (212°F.) for the time recommended. Because of the acid present in them, fruits, tomatoes, and rhubarb keep without spoilage when processed by this method. Non-acid vegetables (all vegetables other than rhubarb and tomatoes) and meats require temperatures higher than that of boiling water (212°F.) for adequate processing. If this method is used for these products, some spoilage is to be expected.

Steamer

The steamer method is recommended only when a constant hard head of steam can be maintained; it is then satisfactory for fruits, tomatoes, and rhubarb. The heat of the stove must be high and steady enough to keep the water in the steamer boiling sufficiently to give a lively current of steam throughout the entire processing period; otherwise, spoilage may occur because of underprocessing. Process the food as in the boiling-water-bath method, increasing the time by from one-fifth to one-fourth, to allow for the cooling of the steamer when the containers are added.

Oven

The oven method is sometimes used for the canning of small fruits, tomatoes, and rhubarb in glass jars. Tin cans cannot be used because of the danger of spreading or bursting the seams; the jars are only partially sealed so that the accumulated steam can escape. The recommended oven temperature is from 250° to 275°F. but the temperature of the liquid within the partially sealed jars will never be noticeably greater than 212°F., or the boiling point of water. For this reason, if the method is considered at all, its use should be confined wholly to fruits, tomatoes, and rhubarb, and under no circumstances should it be used for other vegetables, meat, poultry, or fish. Since air is not capable of conducting heat so rapidly as is water, the processing time must be increased to one and one-half times that used in the water bath. Some of the liquid bubbles out of the jars and is lost and fruits, such as peaches, pears, and apricots, especially when packed without pre-cooking, may develop a brownish color.

Steam pressure

The steam-pressure method (pressure-cooker method) is recommended for non-acid vegetables, meats, poultry, and fish. By this method the food is processed above the temperature of boiling water. The partially sealed jars or completely sealed cans are placed in a pre-heated pressure cooker. The cooker is so constructed that pressures of from 10 to 15 pounds are easily obtainable. If the cooker is properly heated, such pressures result in temperatures of from 240°F. to 250°F. These temperatures can be relied upon to be adequate for the processing of meats and non-acid vegetables if the directions given are followed. Processing at these temperatures is unnecessary for fruits, tomatoes, and rhubarb. Time for processing is counted from the time the stipulated pressure is reached.

EQUIPMENT FOR CANNING

General equipment

Much of the equipment used in canning is found in every household. This is particularly true of the stove, the work table, and the most essential utensils used in the preparation of the food. In addition to these things, a great deal of accessory equipment is available. Much of it is helpful and whether or not it is purchased should depend upon the amount of canning to be done and the amount of money available.

Stove

Any stove which gives a steady high heat is suitable for canning. Make certain that it is in as good condition as possible. If a wood stove is used, have plenty of dry wood at hand to keep a steady hot fire. If an oil stove is used, be sure that the wicks are clean and even. Large-wick burners are desirable.

Work table

The work table must be clean in the beginning, and must be kept clean throughout the entire process, as cleanliness is essential to satisfactory canning. The height of the table should be such that work may be done at it quickly, easily, and comfortably. If possible, have the table near the water supply and not too near the stove.

Utensils

The following utensils should be at hand: a stiff brush for cleaning vegetables and poultry; spoons, including large wooden spoons; small and large sharp knives and a steel fork, preferably of stainless steel; measuring cups or a quart measure; a wire basket, or a large strainer or colander on legs; bowls and shallow pans for holding the food; a long-handled dipper or ladle and a large-mouthed funnel for transferring hot food and liquid to the jars; a jar lifter for putting jars into and removing them from hot vessels; and kettles for precooking the food when this is necessary.

Accessory equipment

Certain tools are helpful if large quantities of a particular product are to be canned: a cherry pitter; a special spoon with sharp edges for pitting clingstone peaches; fruit corers, including a curved knife for removing the cores of halved pears; a pineapple knife; a strawberry huller; peach or apple hand peelers and machine peelers; vegetable slicing and cubing machines, including one to remove corn kernels from the cob; and pea shelling devices.

Scales are useful if supplies are to be measured by weight.

A good thermometer, suitable for placing in liquids, is advisable if fruit

juice is to be preserved by heating at a temperature lower than the boiling point. A thermometer which reads to 250°F. is usable for other purposes.

A sugar tester is useful for testing the sirup if large quantities of fruit are to be canned for sale. To hold the sirup to be tested, a tall narrow cylinder, about 1½ inches in diameter and 12 inches high, is necessary.[11] The sugar tester is known as a *saccharometer* or a *hydrometer*. A Brix or Balling saccharometer which covers a range of from 0 to 70 per cent is suitable. Some of the cooled sirup is poured into the cylinder, and the instrument is floated in it and read. The percentage of sugar present is indicated by the reading at that place where the hydrometer meets the surface of the liquid. The Baumé sugar tester is graduated in degrees instead of percentages. To obtain the approximate percentage of sugar, multiply the degree reading by two.

Processing kettles

Water-bath canners

Any utensil in which water can be boiled, and which has a tightly fitted cover and a rack, can be used as a water-bath canner. The utensil should be deep enough so that the water can cover the containers at least one inch after they are placed on the rack, and still leave a 3- or 4-inch space between the water and the kettle cover. Canners of this type are usually assembled from things already in the home, although water-bath canners fitted with racks may be purchased. A clothes boiler (figure 1), a large lard pail, a new galvanized iron garbage pail, a metal sap bucket, or a deep kettle are suitable. The cover should fit tightly, but not too tightly to prevent the escape of steam. If the cover fits as tightly as most lard-pail covers, it should be perforated with one small nail hole to provide a vent for the steam. The rack should be raised about an inch above the bottom of the kettle to permit free circulation of water under the jars and thus to prevent bumping and breaking. The rack may be wooden, wire, or perforated metal. Wire-mesh fencing or narrow

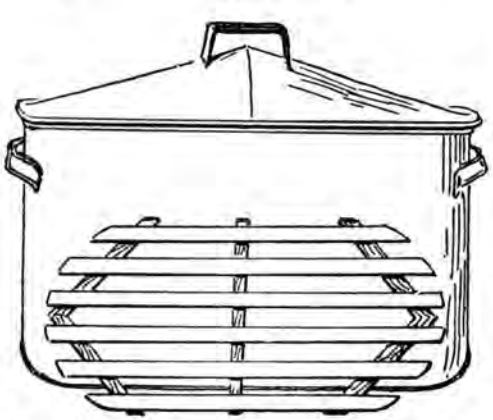

FIGURE 1. A HOT-WATER-BATH CANNER MADE FROM A CLOTHES BOILER, WITH A FALSE BOTTOM USED AS A RACK

[11] For all small-scale home canning, sirups should be made by weighing or measuring the water, rather than by dissolving sugar in water until the desired percentage is obtained as recorded by the saccharometer.

strips of board nailed together, lattice fashion, and weighted to prevent floating, are suitable if supplied with small blocks of wood or metal attached to the rack to raise it the required inch from the bottom of the kettle. A wire basket is desirable because its wire handles makes it possible to lift all the jars in and out of the canner at one time. A tinner can make such a basket at a small cost.

Pressure canners

A pressure canner, or pressure cooker, is a strongly constructed piece of equipment which has a device for clamping down the heavy, tightly fitting cover so securely that steam cannot escape, and can therefore cause an increase of pressure. When heat is applied to water in vessels which have ordinary covers, continued heating, after the water reaches the boiling point (212°F.), causes the water to evaporate without increasing the temperature. With the pressure cooker, however, when the tightly fitting cover is clamped in place, the steam cannot escape and continued heating increases the pressure and the temperature of the steam as shown in table 1.

TABLE 1. APPROXIMATE RELATIONSHIP BETWEEN STEAM PRESSURE AND STEAM TEMPERATURE

Steam pressure	Steam temperature	
Pounds	*Degrees Fahrenheit*	*Degrees Centigrade*
0	212	100
5	228	109
10	240	115
15	250	121
20	259	126
25	267	131

Because of the pressure developed by the steam, the cooker must be built of sturdy, durable material, such as cast aluminum or boiler steel, and must be so constructed that there can be no leakage of steam. Because of its lighter weight, aluminum is more desirable since it is easier for the housewife to lift. The cooker is provided with a low rack. The cover should be equipped with a pressure gauge, a thermometer, a pet cock, and a safety valve. The pressure gauge is usually placed within a case; a small dial indicates the pounds of pressure. Sometimes the pressure gauge has a thermometer scale. Since the pressure is only an indication of the temperature within the cooker when the air has been driven out, the pressure gauge and the thermometer should be independent of one another so that the one may be used to check the accuracy of the other. If a cooker does not have a thermometer attachment, one may be installed for about $2.50.

Since pressure gauges frequently get out of order, it is essential that they be checked at the beginning of each canning season. The pressure-canner lid or the gauge alone may be sent to the manufacturer for checking and

repairs, or the gauge may be checked at home against a master gauge. To do this, unscrew the pet cock or safety valve with a pair of pliers and replace it with a master gauge. Then run the pressure up gradually and compare the two gauges. After the test is completed, replace the pet cock or safety valve and screw it in with a paste of litharge and glycerine, such as plumbers use, so that it will be steam-tight.

The purpose of the pet cock is to provide a necessary vent for the escape of air and steam when the cooker is first heated; it takes about 7 minutes after the steam begins to escape to force all the air out of an eighteen-quart cooker. The pet cock may be combined with the safety valve or the safety valve may be a separate device. The safety valve is really a ball-and-spring arrangement so adjusted that, if the pressure in the cooker is allowed to rise to an unnecessarily high level, steam is released through the valve. This valve and its parts are exceedingly important; they should be simple and easy to clean, as they must be thoroughly cleaned after each using. It is essential that they be in working order before the cooker is used. Under no conditions should a cooker which does not have its valve in good condition be used. Devices for clamping the cover vary with the cooker. Some have a single clamp, others a collar which is screwed tight, and still others a set of several clamps. Any arrangement should be simple to operate and should make a steam-tight closing. A cooker with a flat bottom and straight sides is most economical of fuel and space.

Cookers are made in different sizes and sell at various prices. Probably those used most frequently in home canning have a capacity of from twelve to twenty-five liquid quarts, and sell for from $13.00 to $20.00. The number of containers that the cookers of various liquid-quart capacities usually hold is given in table 2.

TABLE 2. SIZES OF PRESSURE COOKERS AND THEIR APPROXIMATE WEIGHTS AND CAPACITIES FOR CONTAINERS*

Size	Approximate weight*	Glass jars		Tin cans	
Liquid quarts		*Pints*	*Quarts*	*No. 2*	*No. 2½ or 3*
12	14	7	4	10	5
16	16	8	5	12	8
18	18	8	5	14	8
25	27	18	7	16	10
30	35	20	8	20	12
40	50	24	16	25	16

*Container capacity and weight can be only approximated because it varies with the different commercial cookers and with the types of jars.

All of the points discussed should be considered carefully before buying a pressure cooker, and the book of instruction should be read carefully before making any attempt to use the cooker.

Containers and sealers

The container is one of the most important pieces of equipment used in canning. For fruit juices, bottles are usually used. For other food, glass jars or tin cans may be used. Either is satisfactory if it is suitable for the purpose and can be well sealed. For years, only glass jars were used by home canners, but now tin cans also are popular, especially if food is canned in large quantities or small canning factories are available to the home canner. One type of container has as many advantages as the other. The following information may be of assistance in deciding between glass jars and tin cans:

Cost. The initial cost of glass jars is greater than that of tin cans. Glass jars may be used repeatedly, whereas tin cans are usually discarded after the first using. If tin cans are used a second time, they must have new lids. Glass jars with rubber rings must have new rubbers each year; those without rubber rings must have new lids. The tin cans themselves are inexpensive, but the tin-can sealer costs from $8 to $25.

Durability. Glass jars break if they are not handled with reasonable care. Tin cans, although they will not break, cannot be used a second time unless they have been opened carefully and so stored that they remain rust free.

Ease of packing. All tin cans have straight sides and no shoulders and therefore may be packed easily; whereas, if glass jars have mouths much narrower than their shoulders, they are difficult to pack with such food as asparagus stalks, whole tomatoes, and the like. Jars without shoulders may be obtained up to the pint size and in even larger sizes if a tall narrow jar for exhibit purposes is desired. Many wide-mouthed and extra-wide-mouthed jars with mouths only slightly smaller than the sides are also obtainable.

Usefulness. Glass jars may be used in canning any kind of food. Tin cans are made either plain or with enamel linings (page 23), and care should be taken to use only the type of can recommended for the given food.

Exhausting. If raw food is packed in tin cans, they must be subjected to an extra heating process, called *exhausting,* before they are sealed. This expels the dissolved gases so that they will not expand during processing and break the seams of the can. The open cans of food are placed in a boiling-water bath, deep enough to come within about 2 inches of the top of the cans. The heat is regulated so that the water will not boil over into the food, and the water bath is covered. The extra heating is not necessary if the food is thoroughly preheated and packed hot, and is never necessary if glass jars are used. The glass jar may be partially or completely sealed (page 21) during processing.

Loss of liquid. When the gases are driven out of the glass jars during processing, some liquid may be lost, particularly if the food is being processed under pressure. Such loss is impossible with the tin cans because they are completely sealed before processing.

Fuel and time. Tin cans can be stacked on top of one another or placed on their sides during processing, while glass jars cannot be; consequently more cans than jars can be processed in a cooker at one time. Heat penetrates tin more quickly than glass, therefore the processing time of packed cans is slightly less than that of jars. The use of tin cans therefore saves both fuel and time.

Appearance. The product may be seen if it is packed in glass. This is a sales value as well as an aid to the housewife in the selection of food for a particular occasion.

Cooling. Tin cans can be quickly cooled with running water or by plunging them into cold water, whereas glass jars must go through a slower cooling process, which is less desirable.

Storing. Tin cans and flat-topped glass jars can be stacked on the shelves and so are more economical of space than are glass jars which cannot be piled on top of one another. If the distance between the shelves is planned carefully, however, even glass jars which do not have flat tops may be stored with little loss of space.

Glass jars

Select jars that (1) can be perfectly and easily sealed; (2) have a size and shape suitable for the product to be canned; (3) have a durable, clear, preferably colorless glass; and (4) are easy to clean and to store. Glass jars vary in size, in shape, and in the method of sealing. Usually jars come in half-pint, pint, quart, and two-quart sizes. The pint and quart sizes are used most for canning, although some two-quart containers are useful for fruits, and the half-pint jars are convenient for marmalades and conserves. The jars may have rounded or square sides, and wide or narrow mouths. Wide-mouthed jars are easier to pack with food, such as whole tomatoes, halves of peaches, and slices of pineapple, than are narrow-mouthed jars, but the narrow-mouthed ones are entirely satisfactory for such products as peas, corn, and squash. The jar lid may be held in place by a wire bail and spring (figures 2 and 3), or a screw band (figure 4); or the lid may be a screw cover (figures 5 and 6, page 23).

Metal-clamp, glass-top jars

Metal-clamp, glass-top jars are sealed tightly by a glass top, a rubber ring, and a metal clamp. These jars are easy to seal, easy to open, and easy to keep clean. The rubber ring is placed on the jar itself. The metal

clamp is a non-removable wire bail and spring (figures 2 and 3). The jars may or may not be completely sealed before processing. There is some tendency for the jars to break if they are completely sealed; breakage is, however, infrequent. If the jars are not completely sealed before processing, two steps are required to complete the seal: placing the metal clamp in position (figure 2) makes the partial seal; the final seal (figure 3) is made at the end of the processing period. The bail should fit tightly over the lid even before the lower, or tightening, spring is snapped down in place. If the bail is not tight, remove it from the tightening spring and bend it so that it will be more nearly straight across the top; if the bail is too tight, remove it and loosen it by curving it slightly. The wire bends easily when the thumbs are pressed against it. New wire clamps can be purchased.

FIGURE 2. JAR WITH BAIL AND SPRING CLAMP, PARTIALLY SEALED

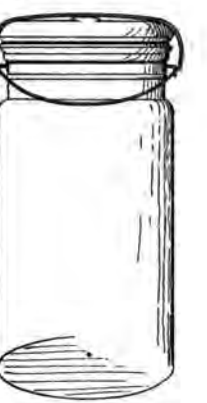

FIGURE 3. JAR WITH BAIL AND SPRING CLAMP, COMPLETELY SEALED

Screw-top jars

Screw-top jars have two types of lids: (1) a metal screw cap which may or may not be porcelain-lined and which may or may not have a rubber ring attached to it at the time of purchase (figures 5 and 6), and (2) a two-piece top consisting of a glass, porcelain, enameled-metal, or sanitary lacquered-metal lid with sealing composition attached, held in place by a metal band which screws down over the lid (figure 4). If a lid corrodes, it is difficult to remove and it may even leak; therefore it is essential that the metal be non-corrosive. Zinc caps, which are the cheapest, are sometimes corroded by such acids as tomato juice and vinegar. With the single-piece caps, and also with some of the two-piece lids, the seal is made tight by a rubber ring. Some of the lids of the two-piece type, however, do not require rubber rings, as they have a sealing composition attached to the lid. Such lids must be replaced each year. It is not necessary, however, to replace the screw band unless, in order to open the jars, it is forced or pried. This may make it useless for future canning, but sometimes the metal can be pressed into shape again.

Testing glass jars

All jars should be examined and, if possible, tested before food is canned in them unless the jars are new and are guaranteed by the manufacturer to have been tested. Examine the jars and lids to see that there are no nicks, cracks, or uneven places where the seal will be made. If no nicks or cracks

are evident, run the finger cautiously around the edge of the jar and cover to detect uneven edges. Test all jars except those that have lids to which a sealing composition is attached, as follows:

Partly fill each jar with hot water. Place the wet rubber ring and lid in position and completely seal the jar. Invert the jar and let it stand inverted for at least 5 minutes. If there is a leak, try the lid on a jar already found to be good and try a good lid on the jar just tested, to determine whether the jar or the lid is faulty. Try a new spring clamp or tighten the bail as directed on page 21, if it seems loose. Discard for canning purposes all jars and lids which are defective when this test is applied. Do not apply the water test to jars having lids to which the sealing composition is attached (figure 4). If products are canned in jars that have not been tested for leaks before use, then the jars should be inverted after processing and cooling. If the jars are inverted while they are hot, the seal may be broken. If leaks are found, the food should be removed and used at once.

Rubber rings

Rubber rings must be bought new each year, since old rubbers cannot be depended upon to withstand the temperature of processing without becoming soft and flabby. Only well-known, reliable brands should be purchased, and these only from dealers who are sure to have new stock. Choose the kind and size of rubber rings that fit the jars and lids on hand. Test the ring by stretching it out twice its length; it should be sufficiently elastic to return to its original size and shape. Double the ring over and press the fold with the fingers; a good rubber will not crack. Do not use rubbers that will not stand both of these tests.

FIGURE 4. VACUUM JAR WITH SEPARATE METAL LID (A) AND SCREW BAND

The lid has a sealing composition attached

Vacuum jars

Jars of the type illustrated in figures 4 and 5 are sometimes called *vacuum jars*. Such jars should be completely sealed before processing. They are so constructed that gases may easily escape during heating, either because the sealing composition (figure 4, *A*) does not actually seal the jars until during the cooling process or because the lids are provided with a metal spring clamp that permits the escape of gases (figure 5). After the jar has been processed and completely cooled, the gas pressure within the jar is so slight that the outside air pressure will hold the lid on indefinitely even if the retaining band is removed from the jar. The sealing of the lid to the glass in the jar in figure 4 prevents the entrance of air.

The metal cap illustrated in figure 5 provides an equally efficient seal, although the cover cannot be removed because the rubber ring is attached to it. These caps have a small hole (*H*) in the center on the inner side of which is a tiny rubber ring (*R*) over which is a metal spring (*S*). The several parts provide a valve which opens to permit the escape of gases during heating. The valve becomes firmly closed during cooling by the outside air pressing the lid, the tiny ring, and the spring firmly together. This cover should be completely screwed on before processing.

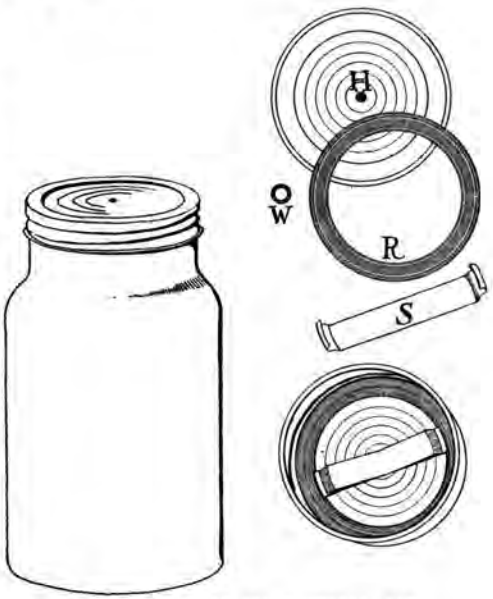

FIGURE 5. JAR WITH METAL TOP
This metal top has a center vent (*H*), a rubber ring (*R*), a small rubber washer (*W*), and a metal spring clamp (*S*)

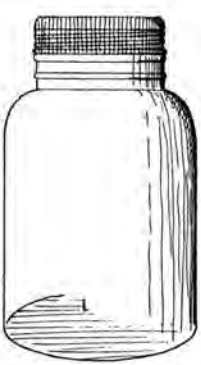

FIGURE 6. JAR WITH ONE-PIECE, PORCELAIN-LINED SCREW TOP

Tin cans

The three sizes of tin cans most used by the home canner are No. 2 (20 ounces or about 2½ cups), No. 2½ (28 ounces or about 3½ cups), and No. 3 (33 ounces or about 4 cups or 1 quart). The tin can most in use and the one recommended for home canning is the sanitary or rim-seal can. A special sealing machine is used to double-seam the cover to the edge of the can. In the groove around the edge of the cover, on that part which comes in contact with the upper edge of the can, there is a composition or paper gasket which helps to insure a perfect seal. The paper gasket is easily broken and must be handled carefully. Do not wet it. Discard the cover if the gasket is broken.

Tin cans may be purchased plain or with enameled linings of two types, R and C. Use R- or sanitary-enamel cans for strongly acid fruits, red fruits and berries, pumpkin, and squash, as these products have a bleached appearance when they are canned in plain tin. Use C-enamel cans for corn and succotash and, if possible, for lima beans, red kidney beans, and chicken, although plain enamel may be used for the beans

and the chicken. The dull gold lining of C-enamel cans will keep the corn from darkening. Use plain cans for the canning of meat and all other products not specifically mentioned. Do not can meat other than chicken in enameled cans.

Tin-can sealers

Simple tin-can sealers cost $8.00. Use these to seal the can by rolling the edge of the can and flattening the rolled edge against the can to make an airtight seam. Both steps are accomplished with the can in one position, the only processes involved are simply turning a crank and moving a lever. More elaborate sealers can be purchased for from $10.00 to $25.00. These not only seal the can but open it and reflange the edge. Both types of sealers may be adjusted to seal cans of two sizes.

Testing tin-can sealer. Place one-fourth of a cup of cold water in a can and seal it, then submerge it in boiling water for a few minutes. If bubbles come up from the can, the seam is not tight.

Bottles and bottle cappers

Narrow-necked bottles are convenient containers for fruit juices. Often, satisfactory bottles containing other liquids come into the home during the course of the year. Such bottles may well be used for fruit juices, and additional ones purchased only if needed. The bottles of juice may be sealed with new cork stoppers, which may or may not be covered with screw caps, or they may be sealed with tightly fitting caps clamped on with a bottle capper. Small, hand bottle cappers that cost about $1.00 are practicable and convenient for the narrow-necked bottles.

YIELD OF HOME-CANNED PRODUCT FROM RAW MATERIAL

The number of containers needed for a product may be determined from table 3. The yields given are approximate, as the products vary, the containers used vary in shape and in the amount of product they will hold, and individuals pack the products differently.

STANDARDS FOR CANNED FRUITS, VEGETABLES, AND MEATS

Appearance

Color: As nearly as possible the color of the natural product.

Clearness: Sirup or liquid clear and as free from seeds, sediment, and bubbles as possible.

Pack: Arrangement with reference to symmetry and economy of space. Uniformity of size and shape. As large a proportion of solids to liquids as possible. Solids evenly distributed. Jars full (except meat).

Container

Appropriateness: Uniform and suitable in size and shape for the product and for practical home use. Easy to clean, fill, and empty. Clear, colorless glass for exhibits.

Neatness: Clean jars perfectly sealed.

Label: Uniform, suitable, well placed, neat.

TABLE 3. APPROXIMATE YIELD OF HOME-CANNED PRODUCT FROM RAW MATERIAL—FRUIT, VEGETABLES, MEAT, AND POULTRY

Product	Amount of fresh product needed to can 1 quart	Number of pints or quarts of canned food to one bushel	Approximate number of pounds of fresh food in one bushel*
Apples	2 quarts	25 quarts	50 pounds
Berries (not strawberries)	1½ quarts	18 quarts from each 24-quart crate	64 pounds
Cherries	1½ quarts (not pitted)	18 to 22 quarts (not pitted)	1 crate of 24 quarts = 45 pounds
Cranberries	1½ quarts		55 pounds
Grapes	2¼ pounds		Sold in 8-quart baskets
Peaches	2 to 3 pounds	16 to 20 quarts (halves)	50 pounds
Pears	2 to 3 pounds	20 to 24 quarts (halves)	60 pounds
Pineapple	2	32 pints	1 crate = 30 pineapples
Plums	1½ quarts	30 quarts	50 to 55 pounds
Strawberries	3 to 4 quarts	20 to 25 pints	1 crate or 32 quarts = 50 pounds
Asparagus	3 to 4 pounds	20 pints	40 pounds; sold in 1-, 2-, or 3-pound bunches
Beans, lima	3 to 4 quarts (in pod)	8 to 10 quarts	30 pounds
Beans, snap	1½ to 2 pounds	18 to 22 quarts	30 pounds
Beets	2½ to 3 pounds	17 to 20 quarts	50 to 60 pounds
Carrots	2½ pounds	17 to 20 quarts	50 pounds
Corn	10 to 12 ears (Golden Bantam)		
Greens	2 to 3 pounds	10 to 13 pints	16 pounds
Peas	4 quarts (in pod)	14 to 16 quarts	30 pounds
Pumpkin or squash	4 pounds (in shell)	20 pints	40 pounds
Tomatoes	3 pounds	14 to 18 quarts	50 pounds
Meat	About 3 pounds of fresh trimmed meat fills a 1-quart container		
Poultry	The meat from a 3½- to 4-pound dressed fowl fills a 1-quart container if the lower leg bones, thigh bones, and wings are the only bones canned		

*Only the approximate weight in a bushel can be given, as the weight varies with the variety, the time of year, and the season.

Quality of contents

FRUITS AND VEGETABLES

Flavor: As nearly as possible the flavor of the natural product. Fruits must not be too sweet.

Texture: Tender, sound, unblemished, uniform ripeness, and firm enough to hold shape. Vegetables not overmature.

MEATS

Flavor: The flavor of freshly cooked meat in first-class condition. The greater portion of the natural juice should be retained in the meat.

Texture: Firm, well-cooked flesh, not broken by overcooking; fat layer should not be too deep.

TABLE 4. REASONS FOR FAILURES TO ATTAIN STANDARDS

Standard product	Common defects	Possible reasons for defects
APPEARANCE (30) Color (10) As nearly as possible the color of the natural product	Too dark	Overcooked* Stood too long in air before packed (possibly too large quantities handled at one time) Too many ground spices added
	Faded	Fruit canned in water instead of sirup Fruit immature Underprocessed, therefore enzyme action possible Precooked too long Stored in too bright light Red-colored food canned in tin cans not enamel-lined
	Uneven color	Uneven ripeness Stood too long in air before packed (possibly too large quantities handled at one time) Iron in water
	Dark at top of container	Air in can during processing because: Air not worked out with spatula or paddle after liquid was added Warm liquid added instead of boiling liquid Tin can not properly exhausted before sealing Air in container after processing because: Jar not sealed promptly after processing Container leaky Lack of liquid (see pack)
Clearness (10) Sirup or liquid clear and as free from seeds, sediment, and bubbles as is possible	Cloudy	Crushed, bruised, overripe, overmature, overcooked* product Careless or unclean handling If fruit juice used, not allowed to settle or not strained Use of table salt, instead of cooking salt If vegetable water used, not clear (if vegetable and clear salt water was used, cloudiness may indicate spoilage)
	Seeds, sediment, floating particles	Same reasons as for cloudy, and also: Dirty sugar used in sirup Starch sediment from overmature vegetables Protein curds from meat (unavoidable)
	Bubbles	Unskimmed sirup of fruit (may indicate leaky jars or spoilage)
Pack (10) Arrangement with reference to symmetry and economy of space. Uniformity of size and shape. As large a proportion of solids to liquids as possible. Solids evenly distributed. Jars full (except meat)	Jar not full to top; too little liquid	Too loose pack Not precooked long enough Overripe product Paddle or spatula not used to let air escape after liquid was added in packing Pressure cooker fluctuated or not cooled to zero before being opened Containers not covered by boiling water in boiling-water bath Jar tipped in the processing kettle Jars not sealed in, or immediately after being removed from, the processing kettle Too much fat in meat (containers of meat will never be full)
	Too much space between products	Uneven size, shape and ripeness; that is, not graded Careless packing; inefficient use of space
	Too much fat on meat	Lack of proper trimming
	Mashed and poor shape	Too tight pack, especially greens or starchy products Overripe product Mouth of container too small for pieces
	Product floats	Not precooked enough, therefore still has too much air Overcooked*, therefore cell structure has collapsed Sirup too heavy for fruit Not enough fruit packed in container

*Overcooking may be due to: precooking too long; processing too long; not cooling quickly and thoroughly after processing.

TABLE 4 (*continued*)

Standard product	Common defects	Possible reasons for defects
CONTAINER (10) Appropriateness Uniform and suitable in size and shape for the product and for practical home use. Easy to clean, fill, and empty. Clear, colorless glass for exhibits	Wrong size or shape for product; mouth too small; not practical to clean and store; odd shapes and sizes	Lack of judgment and foresight in planning Preliminary preparation not adequate
Neatness Clean jars perfectly sealed	Sticky containers; rubber rings not well fitted	Careless workmanship Preliminary preparation and final check not adequate
Label Uniform, suitable, well placed, neat	Too large, too small, poorly placed, poorly written, lack of information	Poor judgment in the selection of labels and lack of care in filling them out and pasting them on the containers
QUALITY OF CONTENTS (60) Flavor (40) For fruits and vegetables: As nearly as possible the flavor of the natural product. Fruits must not be too sweet. For meat: The flavor of freshly cooked meat in first - class condition. The greater portion of the natural juice should be retained in the meat	Tasteless	Fruit underripe or canned in water, too thin sirup, or sirup made from water instead of fruit juice Vegetables and meat unsalted Delicately flavored vegetables canned in fresh brine instead of in brine in which vegetables were precooked
	Strong	Vegetables with pronounced flavors canned in vegetable brine instead of fresh brine
	Too sweet or too tart	Wrong sirup for fruit
	Caramelized	Overcooked*
Texture (20) For fruits and vegetables: Tender, sound, unblemished, uniform ripeness, and firm enough to hold shape. Vegetables not overmature. For meat: Firm, well-cooked flesh, not broken by overcooking; liquid should be jelly-like; fat layer should not be too deep	Hard, tough, fibrous	Undercooked Vegetable overmature Fruit underripe Meat old, of poor quality, frozen
	Soft or mushy	Overcooked* Overripe fruit Crushed in packing
	Uneven	Uneven ripeness, not graded as to ripeness or variety Defective product
	Shrunken	Overcooked* Too heavy sirup

*Overcooking may be due to: precooking too long; processing too long; not cooling quickly and thoroughly after processing.

Score card for fruits, vegetables, and meats

Appearance		30
Color	10	
Clearness	10	
Pack	10	
Arrangement		
Uniformity of size		
Container		10
Appropriateness		
Neatness		
Label		
Quality of contents		60
Flavor	40	
Texture	20	
		100

THE CANNING OF FRUITS, RHUBARB, AND TOMATOES

Spoilage of home-canned fruits is due to imperfect sealing of containers or failure to follow directions carefully.

General directions

Preliminary preparation

The following preliminary preparations are to be made before the day of canning:

1. Read "Carelessness That May Lead to Spoilage" (page 2).

2. Read the recipe for the particular fruit to be canned. Locate, examine, and gather together the necessary equipment.

3. Estimate the number of containers required (table 3, page 25), then add several extra to provide for an emergency.

4. Select containers (pages 19 to 24). Many women find glass jars more satisfactory than tin cans for such acid fruits as berries, cherries, currants, grapes, and plums. Use a container suitable in size both for the product and for the household. Two-quart containers may be used for fruits and tomatoes. Provide enough rubber rings or tin lids, with sealing composition or rubber rings attached, for the glass jars.

a. *If glass jars are selected for use:* (1) Examine the jars and lids to see that there are no nicks, cracks, or uneven places where the seal will be made. If no nicks or cracks are evident, run the finger cautiously around the edge of the jar and the lid to detect uneven edges. Test all jars except those that have lids to which a sealing composition is attached. Partly fill each jar with hot water. Place the wet rubber and lid in position and completely seal the jar. Invert the jar and let it stand inverted for at least 5 minutes. If there is a leak, try the lid on a jar already found to be good and try a good lid on the jar just tested, to determine whether the jar or the lid is faulty. Tighten the bail as directed on page 21, if it seems loose. Discard for canning purposes all jars and lids that are defective when this test is applied. Do not apply the water test to jars having lids to which the sealing composition is attached. (2) Wash in hot soapy water all jars, rubbers, and glass lids, and rinse them thoroughly in clear hot water. Do not wash metal lids to which the sealing composition is attached but dip them in hot water just before putting them on the jars. *Jars that have had spoiled food in them should receive special attention,* because if such jars are not sterilized the spoiled food of one year may result in further spoilage a second year. Thoroughly wash these jars and lids and put them into a pressure cooker at 15 pounds of pressure for 15 minutes, or boil the jars and lids for 2 hours in enough actively boiling water to cover them. (3) Test the

rubber rings by stretching each ring out twice its length; it should be sufficiently elastic to return to its original size and shape. Double the ring over and press the fold with the fingers; a good rubber will not crack. Do not use rubbers that will not stand both of these tests.

b. *If tin cans are selected for use:* (1) Make certain to use the correct lining by consulting tables 6 and 7 on pages 65 and 66. (2) Wash the tin cans in hot soapy water and rinse them thoroughly in clear hot water. Do not wet the paper gasket-lined tin covers. (3) Test the tin-can sealer by filling one or two cans with water, sealing them, and examining the seal for leaks.

5. Consider the kind and quantity of sirup.

Sugar sirups for fruits

Plain sirups

Fruits canned in thin, or light, sirup have a firmer texture, a more natural flavor, and are less likely to shrivel and float than are those canned without sugar. A richer product will be obtained if all fruit juice or part fruit juice is substituted for water. With berries, it is particularly easy to obtain fruit juice. If it is used, take great care not to boil the sirup unnecessarily, because the flavor is changed by too long boiling. If the pack is very close, making an unusually large quantity of fruit in the container, or if the fruit is not fully ripe, a heavier sirup than is ordinarily recommended should be used. The sirups listed in table 5 have been selected for use with various fruits in order to obtain a finished product that has a flavor as nearly as possible like that of the fresh fruit.

TABLE 5. PLAIN SUGAR SIRUPS FOR FRUITS

Sirup	Sugar	Water or fruit juice	Approximate sugar content
	Cups	*Cups*	*Per cent*
No. 1, very thin	1	4	20
No. 2, thin	1	3	25
No. 3, medium	1	2	30
No. 4, thick	1	1	50

To make a plain sirup: Bring the water or fruit juice to a boil, then add the sugar. Boil only long enough to dissolve the sugar. Skim if necessary.

Quantity of sirup: The approximate amount of sirup necessary is: ½ cup for pint jars, ¾ cup for No. 2 cans, and 1 cup for quart jars and No. 3 cans. Less sirup is required for a tight pack than for a loose one.

Spiced sirups

A spiced sirup for peaches, pears, crabapples, and the like is made as follows:

7 cups sugar
2 cups vinegar
6 cups water
½ tablespoon ginger root
1 tablespoon whole cloves
2 two-inch pieces stick cinnamon

Bring all the ingredients to a boil. Allow the mixture to stand overnight, then strain.

A spiced vinegar for sweet pickles is made as follows:

4 cups vinegar
¾ pound, or 1½ cups, sugar
1 teaspoon allspice (whole)
1 tablespoon cinnamon (whole)
1 teaspoon cloves (whole)
1 tablespoon white mustard seed

Mix the vinegar and the sugar. Add the spices tied loosely in a cheesecloth bag, heat the mixture to the boiling point, and boil it in a covered saucepan for 5 minutes. Allow the spices to stand in the vinegar overnight.

The kind and quantity of spices and the quantity of sugar may be varied to suit the taste, but too much sugar shrivels the pickles.

Selection of fruits

With the exception of apples and pears, fruits for canning are best when they are fully ripe before they are picked. Select fully ripe fruit in the prime of condition, since immature fruits are flavorless and overripe fruits are inclined to become mushy. Overripe fruits should be used for jams rather than for canning. A first-class canned product can be obtained only if a first-class raw product is used. Usually fruit brought to the markets of large cities has been picked while it is immature, and is, therefore, lacking in sugar and in flavor. It is a questionable practice to can such fruit. Can the fruit on the day it is picked, if possible; if not, store it in a cool, clean, well-ventilated place in clean open trays, shallow perforated boxes, or baskets. Do not keep the fruit in bags or in sacks, as under these conditions it may become warm and will sweat. The sooner the fruit is canned after picking, the greater will be the preservation of the vitamins.

Steps in canning fruits

Absolute cleanliness of the operator, the work table, and the utensils at all times is essential.

1. Prepare a boiling-water bath containing enough water to cover the containers an inch when they are in place.

Prepare jars and water bath.

2. Select enough clean jars to contain the fruit or to fill the boiling-water bath at one time. Put the jars, a few at a time, into a pan of hot water so that they will be hot when they are packed.

Prepare sirup.

3. Prepare the sirup of the necessary thickness and in the necessary quantity.

4. Grade the product for uniformity of ripeness and size. Discard for canning purposes all overripe and all green fruit.

Grade, wash, and prepare fruit.

5. Wash all the fruit, a small quantity at a time, that is to be processed. Lift the fruit from the wash water rather than pour off the water. Use colanders or wire baskets to save time.

6. Prepare the fruit for canning as directed in the recipe. Use stainless-steel knives. Work quickly.

Pack fruit containers and adjust jar rubbers.

7. If jars of the type illustrated in figures 2, 3, and 6 (pages 21 and 23) are used, place a new, wet rubber on each jar just before it is filled; be sure that the rubber rests flat on the sealing shoulder. If the jars of the type illustrated in figures 4 and 5 (pages 22 and 23) are used—that is, the jars that have lids with rubber rings or sealing composition attached—dip the lid into hot water just before placing the lid on the jar as directed in step 10.

8. Pack the fruit as directed in the recipe into the hot, tested containers, being careful not to crush it. Pack only as many containers as will fit into the water bath at one time. Work quickly.

Fill containers with sirup.

9. After all the containers are packed, set them in a cloth-lined shallow pan and fill them to within ¼ inch of the top with boiling sirup. Use a spatula or thin wooden paddle to work the air out of the jars.

10. Carefully wipe the top of the jars and the rubber rings on the jars and put the lids in place. Seeds or food on the rubber may give an incomplete seal which will result in spoilage.

Clean surfaces to be sealed and adjust lids of containers.

11. Completely seal all glass jars having a non-vent one-piece screw cover (figure 6) or a wire bail (figure 2). If desired the latter may be only partially sealed (page 21). To partially seal such jars proceed as follows: If the jar has a wire bail, click the top bail into position but leave the lower bail up while processing (figure 2). If the jar has a non-vent, one-piece screw top, first screw it in place, then unscrew it half a turn so that it is not tight.

If tin cans are used, do not completely seal them at once unless the fruit has been preheated for some time, packed hot into the cans, and covered with boiling sirup. If the fruit is packed cold in tin cans and then covered with sirup, first ex-

haust the cans by heating them for 2 minutes uncovered in a boiling-water bath which comes halfway up the sides; then seal at once. The heating drives out the air so that the cans will not swell.

12. Lower the hot containers carefully onto the rack in the actively boiling-water bath. Do not allow them to touch each other. Be sure that the water comes one inch over the tops of the containers. Cover the water bath. It is essential to perform the steps from 6 through 12 as quickly as possible, as delay will cause the fruit to lose flavor and may result in the flat sour of tomatoes. Work must be so planned that the boiling-water bath is always waiting and ready for the fruit and that the fruit is never waiting for the water bath.

Place containers in water bath and process.

13. Process the containers for the length of time required. Begin counting the time only when the water comes to a rapid boil again after the containers have been put into the water bath. The water must be kept at a rapid steady boil during the entire processing period. Increase the processing time if for any reason the water does not boil constantly, if the fruit is hard or green, or if the fruit stood for several days before it was canned.

Remove containers from water bath, seal if necessary, and cool.

14. At the end of the processing period, remove the containers and complete the seal at once unless it has already been completed in step 11.

15. Cool jars promptly by setting them upright and far apart in a well-ventilated but not drafty place. Cool tin cans with running water or by plunging them into several changes of cold water. Prompt cooling is essential if a product of the best flavor, color, and texture is to be obtained. Never store jars or tin cans close together until they are cold.

16. Wash the containers thoroughly, handling the jars carefully in order to avoid breaking the seal. The screw bands on the jars having composition-lined lids (figure 4) may be removed when the jars are cold. These jars are of the so-called "vacuum" type and, once cooled after processing, they will remain sealed even when the metal band is removed.

Wash, label, and store containers.

17. Label carefully, giving name of product, date, and grade.

18. Store in a cool, clean, dark, well-ventilated place. Avoid

steam pipes and furnaces. If glass jars are stored in too light a place, the color of the contents may fade.

19. Read pages 24 and 25 for scoring of the finished product; page 26 for common defects and reasons; page 2 for carelessness that may lead to spoilage; and page 7 for reasons for spoilage.

Recipes for canning fruits

Canning fruits without sugar

All fruits may be canned successfully without sugar. If sugar is scarce or if the fruit is to be used for someone who should not have sugar added to food, follow the directions given but can the fruit with fruit juice or boiling water instead of with sirup. Juicy fruits, such as berries, cherries, and plums, should be canned in their own juices without additional water. The juice should be extracted from the riper fruits by crushing, heating, and straining, and should be used in place of the boiling sirup. Less juicy fruits, such as apples, peaches, and pears, will require the addition of water in place of sirup. It is advisable to precook such fruit from 4 to 8 minutes and to add the smallest possible quantity of water. The color, the texture, and the flavor of this product will usually not be so good as the sugared fruit, but the fruit will keep without spoilage and will be wholesome.

Canning fruits with sugar

All directions given are for canning fruits, tomatoes, and rhubarb by the processed-in-the-can method. The flavor of products canned by this method is more nearly like that of the fresh fruit than when the fruit is cooked in an open kettle. There is also less tendency for the fruit to become mushy. If a very full pack is desired, any fruit may be precooked in sirup for a few minutes before it is packed in the container. Fruits cooked in the can do not acquire the transparent appearance which may result when fruits are cooked in an open kettle. If the flavor and the texture of fruits cooked in an open kettle are preferred, they may be cooked in the sirup as long as desired, transferred boiling hot to the containers, then sealed and the containers processed for 5 minutes in the boiling-water bath.

Apples

Can in pint or quart jars or in No. 2 or No. 3 plain tin cans. Process in a boiling-water bath: pint and quart, 15 minutes; No. 2 and No. 3, 10 minutes.

Store winter apples in sufficient quantity so that they may be used for all purposes until April. At this time the best stored apples are still good for eating, but their flavor and texture have so changed that they are a rather poor quality for cooking. It is justifiable, therefore, to can some

apples during the early winter, while they are at their best, in order to have a supply for late spring and early summer.

Use sound, very slightly underripe tart apples for canning. Do not use mellow nor sweet ones. Peel, core, and cut the apples into thin slices. Cut the slices in halves if a close pack is desired. Put the slices into a weak brine (½ tablespoon of salt to each quart of cold water) until all are ready; do not let them stay in the brine too long. Drain the apples on cheesecloth or on a freshly laundered towel. Drop them into enough rapidly boiling thin sirup to cover. Cover the pan. Allow the fruit to come to a boil and boil for 1 minute. Drain by pouring the apples into a large strainer or colander set in another pan to collect the sirup. Transfer the hot apples to the hot containers. Press gently with a wooden spoon but do not mash. Bring the sirup to a boil, then fill the containers with hot sirup. Seal and process according to the general directions for canning fruits (page 28). The sirup which is left should be replenished with fresh thin sirup and used again. The amount that is left finally may be used for applesauce.

Applesauce. Add 2 pounds of prepared, thinly cut apples to each cup of sirup left after the canning of the apples. If the apples are very sour, an additional 2 tablespoons of sugar may be used for each cup of juice. Cook the apples in a covered pan until they are just tender (from 10 to 15 minutes, depending upon the variety of apple and the size of the pieces). Strain if desired; it is not necessary. Transfer the boiling-hot sauce to the hot containers. Seal and process according to the general directions for canning fruits (page 30). Process all containers 6 minutes for unstrained sauce and 10 minutes for strained sauce.

Apricots

Can in pint or quart jars or in No. 2 or No. 3 plain tin cans. Process in a boiling-water bath: pint and quart, 20 minutes; No. 2, 15 minutes; No. 3, 25 minutes. Precooked and packed hot: pint, quart, No. 2 and No. 3, 15 minutes.

Apricots for canning should be ripe and well colored but not too soft. If apricots are overripe, the fruit cooks down to a jam of unattractive appearance; if they are too green, the product has an astringent taste that no amount of sugar can wholly overcome.

Wash the apricots, cut in halves, and remove the pits. Pack the halves tightly, cups downward, in the hot containers, then cover them with boiling medium (or thin) sirup. If a fuller pack is desired, place the apricots in boiling medium (or thin) sirup; bring the apricots to an active boil, then pack immediately, cups downward, in the hot containers. Cover with the hot sirup. Seal and process at once according to the general directions for canning fruits (page 30).

Berries

(Blueberries, blackberries, currants, dewberries, elderberries, huckleberries, loganberries, raspberries)

Can in pint or quart jars or in No. 2 or No. 3 plain or R-enamel tin cans. Process in a boiling-water bath for the time indicated below.

Gather the berries when they are fully ripe. Collect them in shallow pans or baskets to prevent bruising and crushing. Pick them over. Wash them, 1 or 2 quarts at a time, by putting them into a colander and moving it gently up and down in a pan of cold water. Cap and stem the berries if necessary. Can according to one of the following methods:

Method 1:

This is an excellent method of canning dead-ripe or very sweet berries, or those to be used for cooking purposes.

Place the berries, from 1 to 3 quarts at a time, in a cheesecloth bag or on a large square of cheesecloth which is caught up at the four corners to form a bag. Dip the bag of berries into actively boiling water and hold it there for from 15 to 30 seconds. The appearance of spots of color on the cheesecloth indicates that the berries are beginning to lose juice. Remove the bag at once and plunge it into cold water. When cool, drain, remove the berries, and pack them tightly into the containers. During packing, shake the jar and use a wooden spoon to press the berries down; be careful not to crush or mash them. Cover them with a juice made by crushing and straining some of the berries. Seal and process according to the general directions for canning fruits (page 30). Process pint jars and No. 2 cans for 12 minutes; quart jars and No. 3 cans for 15 minutes.

Method 2:

Put the berries, a quart at a time, into 3 cups of simmering medium sirup which is made, if possible, by using strained fruit juice in place of water. Allow the berries to remain in the sirup for from 15 to 30 seconds. Remove the berries with a strainer or a wire spoon and let them stand in a colander to drain further until several quarts of berries have been shrunk in the sirup. If necessary, add fresh sirup to that already in use. Pack the hot berries tightly into the hot containers. During packing, shake the container and use a wooden spoon to press the berries down; be careful not to crush or mash them. Cover them with the sirup in which they were shrunk. Seal and process according to the general directions for canning fruits (page 30). Process pint jars and No. 2 cans for 6 minutes; quart jars and No. 3 cans for 8 minutes.

Method 3:

Berries canned by this method have less of the flavor of the fresh fruit

than if they are canned by one of the other methods. However, this method is simple and easily done. Put the berries into a pan and add from ¼ to ½ cup of sugar to each quart of berries. Cover the pan and heat to the boiling point, then boil the berries gently for 5 minutes. Shake the pan to prevent the berries from sticking. Pack them boiling hot into the hot containers. Add as much of the juice as is desired. Seal and process at once according to the general directions for canning fruits (page 30). Process all containers for 5 minutes.

Cherries

Can in pint or quart glass jars preferably; or in No. 2 or No. 3 R-enamel tin cans, if tin must be used. Process in a boiling-water bath: pint and quart, 25 minutes; No. 2 and No. 3, 20 minutes.

Cherries may be canned with or without the pits. Sweet cherries are not usually pitted, but sour cherries may be. Many persons consider the flavor of the fruit superior if the pit is not removed.

Not pitted. Use ripe freshly picked cherries. Wash, stem, drain, and prick them with a fork. Pack them tightly into hot jars and cover with boiling thin or medium sirup (page 29) if they are sweet, or boiling medium or thick sirup if they are sour. Seal and process according to general directions for canning fruits (page 30).

Pitted. Cherries may be pitted fairly quickly with a small hand pitter; but, since the pitter tends to break up the cherries, hand pitting is more desirable. A thin bent wire or a paper clip may be forced into the place where the stem was attached, and the pit may thus be removed without serious injury to the fruit. Can the cherries immediately after pitting as they lose flavor rapidly. Pack the pitted fruit lightly into the jars. Cover the fruit with boiling thick sirup made from the juice set free when the cherries are pitted. If there is not sufficient juice, cover the cherries with boiling water, let them stand in it for 15 minutes, then drain, and use this juice to make the sirup. Seal and process according to the general directions for canning fruits (page 30).

Cranberries

Can in pint or quart glass jars preferably; or in No. 2 or No. 3 R-enamel tin cans, if tin must be used. Process in a boiling-water bath: all containers, 5 minutes.

Wash and pick over the cranberries. Make the favorite cranberry sauce; or bring 1½ cups of water to a boil, add from 1½ to 2 cups of sugar, and dissolve. To the boiling sirup, add 1 quart (4 cups) of cranberries. Cook covered until the skins are just broken (about 5 minutes). Strain through a coarse sieve if strained sauce is preferred. Pack boiling hot into hot jars.

Seal and process at once according to the general directions for canning fruits (page 30).

Gooseberries

Can in pint or quart glass jars preferably; or in No. 2 or No. 3 R-enamel tin cans, if tin must be used. Process in a boiling-water bath: pint and quart, 20 minutes; No. 2 and No. 3, 15 minutes.

Wash the gooseberries, drain, and cut off the stems and blossom ends with small scissors. To obtain the best flavor, prick each berry with a fork. Put 1 quart of berries at a time into about 3 cups of boiling medium sirup and leave them there for from 15 to 30 seconds. Remove them to a colander where they can drain until several quarts have been prepared. Pack them closely into hot jars, then cover with the boiling sirup in which they have been shrunk. Seal and process according to the general directions for canning fruits (page 30).

Grapes

Can in pint or quart jars or in No. 2 or No. 3 R-enamel tin cans. Process in a boiling-water bath: pint and quart, 18 minutes; No. 2 and No. 3, 15 minutes.

Grapes are not usually canned, as it is more practical to make grape juice. To can, remove grapes from the clusters, wash, and pack into jars. Press down on the fruit during the packing so that there is enough juice set free to cover the fruit. Seal and process according to the directions for canning fruit (page 30). Tartrate crystals may separate during the months the grapes stand in the jars. The crystals are harmless and the juices may be poured off from them.

Peaches

Can in pint or quart jars or in No. 2 or No. 3 plain tin cans. Process in a boiling-water bath: pint and quart, soft 25 minutes, firm 35 minutes; No. 2 and No. 3, soft 20 minutes, firm 30 minutes. Precooked: pint, quart, No. 2 and No. 3, 15 minutes.

Can peaches on the day they are picked. Fully ripe, but not soft, fruit has the best flavor. Grade the peaches according to size. Put 10 or 12 at a time into a wire basket and plunge the basket into boiling water for from 30 to 60 seconds or until the skins can be slipped off easily. Remove the basket and set it in a pan of cold water. Skin the peaches quickly. Cut the peaches in halves and remove the pits if they are freestone, otherwise leave whole or not, as preferred. Allow the peeled peaches to stand in a weak brine (½ tablespoon of salt to each quart of cold water) until they are ready to pack. Drain on cheesecloth. Pack the halves tightly, cups downward, in the hot containers, then cover them with boiling, very thin sirup if they are fully ripe, or with thin to medium sirup if they are not fully ripe. If the flavor of the pit is desired, boil several cracked pits in the water with

which the sirup is made. Can in a spiced sirup if preferred (page 29). Seal and process at once according to the general directions for canning fruits (page 30).

Precooked peaches. If a fuller pack is desired, the peeled peaches may be simmered in the sirup for from 4 to 8 minutes. Do not cook until soft. Pack the peaches tightly, cups downward, in the hot containers. Fill the containers with hot sirup.

Baked peaches. Place the peeled halves of peaches in a baking dish. Add 2 teaspoons of sugar to each peach, and lemon and nutmeg to taste. Cover the dish, and bake covered in a medium oven (400°F.) for from 15 to 20 minutes, or until almost tender. Pack boiling hot in the hot containers, then cover with boiling thin sirup. Seal and process according to the general directions for canning fruits (page 30). Process all containers for 15 minutes.

Lye peeling of peaches. If a bushel or more of peaches are to be canned at one time, lye peeling is frequently used. It should be used only when there is plenty of water, preferably running water. Bring 1 gallon of water to the boiling point in an agate, porcelain, or iron kettle (never in an aluminum kettle). Add from 2 to 4 tablespoons of lye (caustic soda). Fill a wire basket with peaches and lower it into the boiling lye. The lye must cover all the peaches. Allow the fruit to stay in the lye for from 15 to 60 seconds, depending upon the ripeness of the fruit. Remove the basket quickly and wash the fruit immediately in running water, or in four or five changes of water in a large utensil. Rub off any bits of skin which adhere to the peaches and transfer them at once to weak brine (1 tablespoon of salt and 1 teaspoon of vinegar to each quart of cold water). Halve, drain, and pack as quickly as possible. Remember that lye is caustic; it will injure hands, clothing, and polished woodwork.

Pears

Can in pint or quart jars or in No. 2 or No. 3 plain tin cans. Process in a boiling-water bath: pint and quart, 20 minutes; No. 2 and No. 3, 20 minutes.

Pick the pears when they are fully grown but still green. Allow them to ripen in storage. Can them when they are very slightly underripe. Grade for uniformity of size and ripeness. Can the large ones in halves and the small ones whole. If they are to be canned whole, peel, remove the blossom end, but leave the stem; if they are to be canned in halves, remove also the stem and core. Place them in a weak brine (½ tablespoon of salt to each quart of cold water). Drain on cheesecloth or on a freshly laundered towel. Transfer them to boiling thin or medium sirup. Cover the pan and allow the pears to boil for 1 minute after the sirup has again

begun to boil. Remove from the sirup. Pack halves tightly, cups down, in the hot containers. Pack whole pears with the bottom layer stems up, the next layer stems down, the following layer stems up, and so on. Cover with the boiling sirup in which they have been heated. Put a small piece of stick cinnamon in each container if desired. Seal and process according to the general directions for canning fruits (page 30). Pears may be precooked or canned in spiced sirup or baked, as directed for peaches.

Pineapple

Can in pint or quart jars or in No. 2 or No. 3 plain tin cans. Process in a boiling-water bath: pint and quart, 30 minutes; No. 2 and No. 3, 25 minutes.

Although pineapple is not native to New York State, at the height of the season it is cheap and it is justifiable to buy it for canning. Can only fully ripe, sound pineapples; the underripe fruit is flavorless. Cut off the base and twist out the top. Set the pineapple on its base and cut from top to bottom following the curve of the fruit and cutting to about half the depth of the eyes. Slice in pieces of any desired thickness. Trim the slices, removing the remainder of the eyes and the core. (These trimmings may be boiled in the water from which the sirup is made.) Leave the slices whole, or cut them into pieces of suitable size and arrange them so that they appear as whole slices. Pack the containers tightly, placing the slices on top of one another, and putting the odd pieces into one container. Cover with thin to medium boiling-hot sirup, depending upon the sweetness of the pineapple. Seal and process according to the general directions for canning fruits (page 30).

Plums

Can in pint or quart glass jars, preferably; or in No. 2 or No. 3 R-enamel tin cans, if tin must be used. Process in a boiling-water bath: pint and quart, 20 minutes; No. 2 and No. 3, 15 minutes.

Pick the plums which are to be canned just as they begin to become soft and ripe. If the fruit is too ripe, the canned product "jams;" if it is too green, it is sour and lacking in flavor. Plums are usually canned whole and with their skins on, but the quality is greatly improved if the skins are removed. If the skins are left on, prick the plums with a fork. If the plums are to be peeled, place them in a wire basket and plunge it into boiling water for from 45 to 60 seconds. Remove the basket and let the plums stand for several minutes. The fruit becomes reddish from contact with the skin; if the plums are peeled immediately, they are yellowish or greenish depending upon the variety. Skin quickly at the end of the few minutes, or the plums will turn brown. Shrink the plums in one of two ways: (1) Place them in a simmering thick sirup and let them stand there for 5 minutes, then pack them tightly in the jars; or (2) pack them tightly in the jars and place the jars in the oven or in a pan of hot water until the juice flows, then drain

off the juice and repack the jars. In either case, cover the packed fruit with medium to thick boiling sirup, depending upon the tartness of the plums. Seal and process according to the general directions for canning fruits (page 30). The tartness of the fruit is considerably modified if the juice is drained off as indicated in method 2. From this juice and from the skins, excellent jelly can be made.

Rhubarb

Can in pint or quart glass jars, preferably; or in No. 2 or No. 3 R-enamel tin cans, if tin must be used. Process in a boiling-water bath: pint and quart, 20 minutes; No. 2 and No. 3, 15 minutes.

Select young, tender stalks of rhubarb. The first cuttings are more tender and juicy, and have better color and flavor than do the older stalks. The later crop is strongly acid and does not make the best canned product. Wash carefully and trim. Cut off the root and tip end, but do not skin. Cut in from ½- to 1-inch pieces. Pack the pieces tightly into the jars and cover them with boiling-hot thick sirup. Seal and process according to the general directions for canning fruits (page 30).

The flavor and fuller pack of precooked rhubarb is preferred by some. If this flavor is desired, proceed as follows: Add ¼ cup of sugar to each cup of rhubarb. Either place the rhubarb in a pan, cover, and simmer on top of the stove for 5 minutes or put it into a covered baking dish and bake in a moderate oven (400°F.) until it is somewhat tender (from 8 to 10 minutes). Transfer at once to hot jars. Seal and process according to the general directions for canning fruits (page 30). Process pints and quarts for 5 minutes.

Strawberries

Can in pint or quart glass jars, preferably; or in No. 2 or No. 3 R-enamel tin cans, if tin must be used. Process in a boiling-water bath for the time indicated below.

Can fully ripe, juicy berries. Green, overripe, or mealy berries give a poor canned product. Wash them thoroughly, drain, and hull. Put from 1 to 3 quarts of hulled berries into a pan, and add 2 tablespoons of water and from ½ to 1 cup of sugar for each quart of berries. The lower quantity of sugar will give berries with a good strawberry flavor but a poor color; the higher quantity of sugar will give sweeter, firmer berries with a good color but not so pronounced a strawberry flavor. Cover the pan. Bring the berries to the boiling point and simmer, covered, for from 5 to 8 minutes. Do not heat more than 3 quarts of berries at one time. Allow the berries to stand in the sirup for from 3 to 4 hours. They may stand as long as 12 hours, but the flavor is not so good as when they stand for the shorter time. This treatment prevents, to a considerable extent, the berries from rising to

the top, and yields a product of delicious flavor. If the berries are boiled for 15 minutes instead of from 5 to 8 minutes before they are allowed to stand, they will not rise to the top at all. The flavor, however, is not nearly so good as it is with the shorter boiling. Even with the shorter boiling, a fairly even distribution of berries can be obtained if the jars are carefully inverted and set upright again several times during the first week after they are canned. If this is done, care must be taken not to break the seal by careless handling. Bring the berries and sirup just to the boiling point and transfer both immediately to hot jars. Seal and process according to the general directions for canning fruits (page 30). Process all containers for 5 minutes.

Crushed strawberries. (These may be used in ice cream or any dessert which calls for crushed berries.) Wash, drain, hull, and mash the berries. To each pint of crushed berries, add ¾ cup of sugar. Mix well. Fill the jars. Seal and process according to the general directions for canning fruits (page 30). Process pints for 12 minutes and quarts for 15 minutes.

Tomatoes

Can in pint or quart jars or in No. 2 or No. 3 plain or R-enamel tin cans. Process in a boiling-water bath: pint and quart, 35 minutes; No. 2 and No. 3, 30 minutes.

Tomatoes are easy to can if only small quantities are canned at one time. Spoilage, usually flat sour, takes place, however, if the tomatoes are allowed to stand in a warm room for any length of time while they are being prepared for processing. To avoid spoilage, work quickly, process promptly after packing, and cool immediately after processing. Use tomatoes which have been well ripened on the vines. Do not can overripe tomatoes or those from which decayed spots have been removed. If tomatoes which are green around the stem part must be canned, cut away and discard all green portions. The presence of such portions will produce a product of inferior flavor and color. Wash the tomatoes in cool water. Place them, from 8 to 10 at a time, in a wire basket and plunge it into actively boiling water for 1 minute. Use this minute to prepare a second basket. If the tomatoes are ripe, the skins can be slipped off easily at the end of this time.[12] Remove the basket and plunge it into cold water for from ½ to 1 minute or until the tomatoes are just cool enough to handle. Set the basket in an empty bowl. Remove the cone-shaped core of each tomato with a slender, pointed knife. Remove the skins by slipping them off quickly with the hand. Be sure that

[12] If the tomatoes are kept in the boiling water too long, the pulp will be softened and will cling to the skin when it is removed. Also, the skins will not slip off easily if the water is not boiling, if the tomatoes are not kept in the boiling water long enough, if they are allowed to become too cold in the cold water, or if they are not ripe. Precious time will then be lost because the tomatoes will have to be peeled. This loss of time may result in the development of flat sour in those tomatoes which are waiting to be processed.

the small black spot at the blossom end is removed. Cut the tomatoes into quarters and drop the portions into a shallow pan. When all the tomatoes which were in the first basket are cut, pack them into the containers by hand. Press them down just hard enough to form sufficient juice to fill the spaces and cover the solids. Fill the containers to the top in this manner. Do not add water. Add 1 teaspoon of salt to each quart of tomatoes, and from 1 to 3 teaspoons of sugar if desired. Add the salt and sugar just before putting in the last few pieces of tomato. Seal the containers when all are ready for processing, and process at once according to the general directions for canning fruits (page 30).

Whole tomatoes may be canned for salad or for exhibit purposes. There is no advantage in canning whole tomatoes for other purposes, because the process requires more time, fewer tomatoes can be packed in a given number of containers, and tomato juice to pour over them must be prepared from other tomatoes. Whole tomatoes to which tomato juice has been added should not be sold, as the pure-food laws define as "adulterated" those tomatoes to which water or tomato juice has been added.

Tomato juice

Can in pint or quart jars or in No. 2 or No. 3 plain or R-enamel tin cans. No processing is necessary.

Can in relatively small quantities because of the danger of flat sour. Use fruit which has been well ripened on the vines. Do not use fruit which is overripe or from which decayed spots have been removed. If fruit which is green around the stem part must be used, cut out and discard all green portions. Wash the tomatoes, trim, and quarter, but do not peel. Put the pieces into a pan in which they can be cooked. Crush in order to set free juice to start the cooking. Cover the kettle, and simmer gently until the tomatoes are soft but not mushy. If preferred, the tomatoes may be put into a steamer and heated until they are soft. Press the pulp through a sieve or a colander which is fine enough to remove the seeds. Use a wooden masher, a glass jar, or a milk bottle to force the pulp through the strainer. Bring the strained tomato juice just to the boiling point. Transfer the boiling hot juice to the hot containers. Add 1 teaspoon of salt to each quart of tomato juice, and from 1 to 3 teaspoons of sugar if desired. Seal at once and invert to cool. No processing is necessary.

Fruit mixture

Can in pint or quart jars or in No. 2 or No. 3 plain tin cans. Process in a boiling-water bath for the time required by that fruit which, when processed alone, requires the longest processing period.

Any desirable mixture of fruits may be canned together. Prepare each fruit as if it were to be canned alone. Pack in any desired proportion, then

cover with thin to medium boiling sirup, depending upon the fruits selected and upon whether the fruit is to be used for salad or for dessert. Salad fruit requires only a thin sirup. Seal and process according to the general directions for canning fruits (page 30). Suggested combinations are:

(1) 3 Bartlett pears, 3 peaches, 3 slices of pineapple, 3 tart apples.
(2) 3 Bartlett pears, 3 Green Gage plums, ½ cup of gooseberries.
(3) 3 Bartlett pears, 3 peaches, ½ cup of cherries.

THE CANNING OF VEGETABLES

Spoilage of home-canned vegetables, meats, poultry, and fish is due to (1) poor, raw products; (2) packing good products too tightly; (3) imperfectly sealed containers; or (4) failure to follow directions for canning.

The canning of non-acid vegetables (all vegetables other than rhubarb and tomatoes) without a pressure cooker is not recommended.

General directions[13]

Preliminary preparation

The following preliminary preparations are, if possible, to be made before the day of canning:

1. Read "Carelessness That May Lead to Spoilage" (page 2).

2. Read the recipe for the particular vegetable to be canned. Locate, examine, and gather together the necessary equipment.

3. Estimate and select the number of containers required (table 3, page 25), then add several extra to provide for an emergency. Provide enough rubber rings or tin lids, with sealing composition or rubber rings attached, for the glass jars. Can corn, lima beans, peas, pumpkin, and squash in pint jars or No. 2 cans in preference to larger containers, since these vegetables are most difficult to process. Do not use two-quart containers for any vegetable. (Remember that tomatoes are classed as fruit; they may be canned in two-quart containers.)

a. *If glass jars are selected for use:* (1) Examine the jars and lids to see that there are no nicks, cracks, or uneven places where the seal will be made. If no nicks or cracks are evident, run the finger cautiously around the edge of the jar and the lid to detect uneven edges. Test all jars except those that have lids to which a sealing composition is attached. Partly fill each jar with hot water. Place the wet rubber and lid in position and completely seal the jar. Invert the jar and let it stand inverted for at least 5 minutes. If there is a leak, try the lid on a jar already found to be good and try a good lid on the jar just tested, to determine whether the jar or the lid is faulty. Tighten the bail as directed on page 21, if it seems loose. Discard for canning purposes all jars and lids that are defective when this

[13] The directions are for all vegetables except rhubarb and tomatoes. These are canned like fruit. Refer to *General Directions for Canning Fruit*, page 30.

test is applied. Do not apply water test to jars having lids to which the sealing composition is attached. (2) Wash in hot soapy water all jars, rubbers, and glass lids and rinse them thoroughly in clear hot water. Do not wash metal lids to which the sealing composition is attached but dip them in hot water just before putting them on the jars. *Jars which have had spoiled food in them should receive special attention* because if such jars are not sterilized the spoiled food of one year may result in spoilage a second year. Thoroughly wash the jars and lids and put them into a pressure cooker at 15 pounds of pressure for 15 minutes, or boil the jars and lids for 2 hours in enough actively boiling water to cover them. (3) Test the rubber rings by stretching each ring out twice its length; it should be sufficiently elastic to return to its original size and shape. Double the ring over and press the fold with the fingers; a good rubber will not crack. Do not use rubbers that will not stand both of these tests.

b. *If tin cans are selected for use:* (1) Make certain to use the correct lining by consulting tables 6 and 7 on pages 65 and 66). (2) Wash the tin cans in hot soapy water and rinse them thoroughly in clear hot water. Do not wet the paper gasket-lined tin covers. (3) Test the tin-can sealer by filling one or two cans with water, sealing them, and examining the seal for leaks.

4. Examine the pressure cooker to see that the valve, the pet cock, the pressure gauge, and the thermometer are all in working order. Under no circumstances use a pressure cooker which does not have its valve and pet cock in good condition.

Selection of vegetables

Unlike fruit, which should be fully ripe when canned, most vegetables should be young and immature for canning. Do not can overmature or stale vegetables, as a poor product of doubtful keeping quality will result. A first-class canned product can be obtained only if a first-class raw product is used.

Can all vegetables promptly after harvesting. A slogan used by the pea canners, "one hour from field to can," is an excellent aim, as the flavor of vegetables canned as quickly as possible after harvesting will be far superior to, and the vitamin content will be higher than, that of vegetables which have stood around for hours before being canned.[14] Nothing can be added in the canning process which will make up for the flavor which is lost. Furthermore, the bacteria on the vegetables increase and cause spoilage. To keep the number of bacteria as low as possible, gather the vegetables in trays, baskets, or perforated boxes (never in bags or sacks in which they can sweat), and keep them in a cool place while they are being graded. Usually vegetables brought to the markets of large cities have been picked on the

[14]Pumpkin and squash are exceptions. These will be best if allowed to ripen thoroughly in storage before canning.

previous day and may be contaminated with larger numbers of bacteria and be poorer in flavor than the freshly picked product.

Steps in canning

Absolute cleanliness of the operator, the work table, and the utensils at all times is essential.

1. Heat enough water to make the necessary amount of boiling weak brine (1 tablespoon of salt to each quart of water). It is convenient to have an additional supply of this brine in the teakettle.

Prepare brine, jars, and pressure cooker.

2. Select enough clean glass jars to contain the product to be canned or to fill the pressure cooker. Put the jars, a few at a time, into a pan of hot water so that they will be hot when they are packed.

3. Put the pressure cooker, which has already been tested, at or near the place where it will be heated. Pour about a cup of boiling water into it, just enough to not quite cover the rack.

4. Do not plan to can too many vegetables at one time, as they must be handled quickly. Grade the vegetables for uniformity of ripeness and size, discarding for canning purposes all overmature products.

Grade, wash, and prepare vegetables.

5. Wash thoroughly in cool water all the vegetables to be processed at one time. Wash a few at a time and lift them out of the wash water rather than pour off the water. Use colanders and wire baskets to save time.

6. Prepare the vegetable for canning as directed in the recipe. Work quickly.

7. If jars of the type illustrated in figures 2, 3, and 6 (pages 21 and 23) are used, place a new, wet rubber on each jar just before it is filled; be sure that the rubber rests flat on the sealing shoulder. If the jars of the type illustrated in figures 4 and 5 (pages 22 and 23) are used — that is, the jars have lids with rubber rings or sealing composition attached — dip the lids into hot water just before placing the lids on the jars as directed in step 10.

Pack vegetables in containers and adjust jar rubbers.

8. Pack the hot vegetables as directed in the recipe into the hot, tested containers, being careful not to overpack. Pack only as many containers as will fit into the pressure cooker at one time. Work quickly.

Fill containers to within ¼ inch of the top with brine.

9. After all the containers are packed, fill them to within ¼ inch of the top with the boiling brine in which the vegetables were precooked, with fresh boiling brine, or with salt and boiling fresh water as directed in the recipe or as preferred. The brine in which the vegetables were cooked will give the most nutritious product, but the liquid may not be clear and frequently the flavor of the canned product is superior if fresh brine is used. If this liquid can be used immediately for soups and gravies, there will be no loss of mineral matter and the use of fresh brine will be justified if preferred. If necessary, use a spatula or thin paddle to work the air bubbles out of the jars.

10. Carefully wipe the tops of the jars and the rubber rings, and put the lids in place. Seeds, fat, or food on the rubber may give an incomplete seal which will result in spoilage.

Clean surfaces to be sealed and adjust lids of containers.

11. Completely seal all glass jars having a non-vent one-piece screw cover (figure 6) or a wire bail (figure 2). If desired, the latter may be only partially sealed (page 21). To partially seal such jars proceed as follows: If the jar has a wire bail, click the top bail into position, but leave the lower bail up while processing (figure 2). If the jar has a non-vent, one-piece screw top, first screw it in place, then unscrew it half a turn so that it is not tight.
Completely seal tin cans at once.

12. Place the hot containers in the hot pressure cooker. Glass jars should not touch each other. Tin cans may be either piled on top of each other or placed on their sides.

13. Carefully wipe the cover and the top edges of the pressure cooker. Clamp the cover in place. It is essential to do steps 6 through 13 as quickly as possible as delay may result in flat sour.

Place containers in prepared pressure cooker and process.

14. Process the containers for the length of time required. Allow the pet cock of the pressure cooker to stay open for from 7 to 10 minutes so that all the air is forced out of the cooker before the pressure is allowed to rise, as the required high temperature will be reached only if all the air is driven out. After the pet cock is closed, from 5 to 10 minutes will be needed to reach the desired pressure. *Begin counting the processing time only after the desired pressure is reached.* Increase the processing time if the vegetables are overmature,

if they are very tightly packed, or if the pressure fluctuates. If the pressure fluctuates, some of the liquid in the jars may be lost.

Allow pressure to fall to zero.

15. At the end of the processing time, remove the cooker from the stove or turn off the heat. If glass jars have been used, be sure to allow the pressure gauge to fall to zero and stay there for 2 minutes before slowly and carefully opening the pet cock. Air should rush in but steam should not rush out. If tin cans are used, the pet cock may be cautiously opened before the pressure gauge reaches zero.

Open cooker and seal jars at once.

16. Remove the cover from the cooker and quickly complete the seal of the jars while they are still in the cooker unless the seal has already been completed in step 11. The cooker should not be so full that this is impossible.

Remove containers and cool.

17. Remove the containers immediately and cool them promptly. Set glass containers upright and far apart in a well-ventilated but not drafty place. Cool tin cans with running water or by plunging them into several changes of cold water. Prompt cooling is essential if a product of the best flavor, color, and texture is to be obtained. Never store jars or tin cans close together until they are cold. Failure to observe this precaution may result in the spoilage of an entire batch of food.

Wash, label, and store containers.

18. Wash the containers thoroughly, handling the jars carefully in order to avoid breaking the seal. The screw bands on the jars having composition-lined lids, illustrated in figure 4, may be removed when the jars are cold. These jars are of the so-called vacuum type and, once cooled after processing, they will remain sealed indefinitely even when the metal band is removed.

19. Label carefully, giving name of product, date, and grade.

20. Store in a cool, clean, dark, well-ventilated place. Avoid steam pipes and furnaces. If glass jars are stored in too light a place, the color of the contents may fade.

21. Read pages 24 and 25 for scoring the finished product; page 26 for common defects and reasons; page 2 for carelessness which may lead to spoilage; and page 7 for reasons for spoilage.

Recipes

Asparagus

Can in straight-sided pint or quart jars or in No. 2 or No. 3 plain tin cans. Process at 10 pounds of pressure: pint, 30 minutes; quart, 35 minutes; No. 2, 30 minutes; No. 3, 30 minutes.

Can only young and tender asparagus, and can it immediately after harvesting. Asparagus quickly loses its flavor if it is allowed to stand for any length of time after it is cut. Grade it according to size and maturity. Set aside the overmature stalks for immediate use; cut the others so that they will be just long enough to fit upright in the container. Remove the coarse scales from the lower section of the stalks. Wash the stalks thoroughly in cool water. Be particularly careful to remove all sand from the tips. Tie the stalks in bunches, using from twenty to thirty stalks to a bunch, depending upon their size. Stand the bunches three or four at a time, with their tips uppermost, in a pan containing enough actively boiling salted water (1 level tablespoon of salt to each quart of water) to cover all but the upper third of the bunches. Boil uncovered for 3 minutes. Tip the bunches over on their sides and boil for ½ minute longer. Remove the bunches and place them in a large pan of cold water for 1 minute, to chill the stalks so that they may be handled easily. Untie the bunches and pack the asparagus in the hot containers. The stalks should be packed with their tips upright, except for three or four stalks in the center of the container which should be packed tips downward. This arrangement helps to keep the stalks whole when they are removed. Add ½ teaspoon of salt to each pint of asparagus and fill the containers with boiling water. Seal and process according to the general directions for canning vegetables (page 45).

If small pieces are preferred, cut the stalks into ½-inch or 1-inch pieces after they are scaled and washed. After the asparagus has been boiled for 3 minutes in the salted water, remove the pieces and transfer them directly to the hot containers and fill the containers with liquid as directed in the preceding paragraph.

The flavor of the butt ends of the stalks is not sufficiently good to warrant canning them. The more tender portions, however, when cooked in the salted water left over from the canning process, may be satisfactory for immediate serving or for soup.

Beans, baked

Can in pint or quart jars or in No. 2 or No. 3 plain tin cans. Process under 10 pounds of pressure: pint, 40 minutes; quart, 50 minutes; No. 2, 35 minutes; No. 3, 40 minutes.

During the winter when the wood or coal fires are kept burning, it is practical to bake beans in quantities larger than will be used. The surplus beans may then be canned for use during the warmer months. Bake the

beans in the same way as for immediate use, but stop the cooking before the beans are quite done. Have more liquid than usual, as the beans must be very juicy for canning. Transfer the boiling hot beans and liquid to the hot containers. Fill the jars to the top with the loosely packed beans. Avoid crushing. Seal and process according to the general directions for canning vegetables (page 45).

Beans, lima and shell[15]

Can in pint or quart jars or in No. 2 or No. 3 plain or C-enamel tin cans. Process at 10 pounds of pressure: pint, 50 minutes; quart, 55 minutes; No. 2, 40 minutes; No. 3, 50 minutes.

Can only young lima and shell beans, and can them immediately after picking. Dry, rather than can, all mature beans. Wash the beans, then shell them. Put the shelled beans into a strainer or fine-mesh wire basket and plunge it into a pan containing just enough actively boiling salted water (1 level tablespoon of salt to each quart of water) to cover the beans. Boil uncovered for 3 minutes. If preferred, the beans may be put into a steamer and thoroughly heated instead of being boiled. Remove the beans and transfer them directly to the hot containers. Fill the containers to within 1 inch from the top with loosely packed beans. This space allows for swelling and permits the proper heat penetration. Either fill the jars with the boiling salted water in which the beans were boiled, or add ½ teaspoon of salt to each pint of beans and fill the containers with boiling water. A very small piece of bacon or pork may be added to the shell beans for flavor. Seal and process at once according to the general directions for canning vegetables (page 45).

Beans, snap

Can in pint or quart jars or in No. 2 or No. 3 plain or C-enamel tin cans. Process at 10 pounds of pressure: pint, 30 minutes; quart, 35 minutes; No. 2, 25 minutes; No. 3, 30 minutes.

Can only young and tender snap beans, and can them immediately after harvesting. Mature beans and beans which have been allowed to stand for any length of time after harvesting are more subject to flat sour after they are canned than are young, fresh beans. Wash the beans thoroughly in cool water. Cut off the stem and blossom ends with a sharp knife. If string beans are used instead of snap beans, remove the strings. Leave the pods whole or cut them into ½-inch or 1-inch pieces as desired. Put the beans into a pan containing enough actively boiling salted water (1 level tablespoon of salt to each quart of water) to cover the beans. Boil uncovered for 3 minutes. If preferred, the beans may be put into a steamer and heated thoroughly instead of being boiled. Remove the beans. If

[15]Refer to the footnote to table 6, page 65.

they are cut into small pieces, transfer them directly to the hot containers. Fill the container, but do not pack or shake down the beans. If the beans are whole, chill them in cold water for about 1 minute, so that they may be handled easily. Pack them upright and moderately tight in the container. Pack the lower layer completely before beginning the upper one. Add ½ teaspoon of salt to each pint of beans and fill the containers with boiling water. Seal and process at once according to the general directions for canning vegetables (page 45).

Beets

Can in pint or quart glass jars or in No. 2 or No. 3 R-enamel tin cans. Process at 10 pounds of pressure: pint, 30 minutes; quart, 35 minutes; No. 2, 30 minutes; No. 3, 30 minutes.

Can only small red beets, from 1 inch to 1½ inches in diameter. Leave the root, but cut off the stem to within 1 inch of the beet, then wash thoroughly. Put the beets into boiling water or into a steamer, and heat them until the skins slip easily (from 15 to 20 minutes). This may also be accomplished by heating the beets for 2 minutes in a pressure cooker at 15 pounds of pressure. Plunge the beets into cold water, and leave them there until they are just cool enough to handle. Slip off the skins, stems, and root ends. No cutting nor peeling should be necessary for this. Do not let the peeled beets stand in cold water. Pack the whole beets tightly into the containers and fill the containers with boiling unsalted water. If salt is added, the beets lose their bright red color. One tablespoon of vinegar may be added to each quart of beets to intensify the red coloring; the flavor is changed only slightly and some persons consider the change an improvement. Seal and process according to the general directions for canning vegetables (page 45).

Broccoli

Can in pint or quart jars or in No. 2 or No. 3 plain tin cans. Process at 10 pounds of pressure: pint, 55 minutes; quart, 60 minutes; No. 2, 50 minutes; No. 3, 55 minutes.

Can only young and tender broccoli, and can it immediately after harvesting. Wash it thoroughly. Cut off the tougher stem portion and discard it, but peel the stem portion that has a tender center. Cut the whole (stem, leaves, and head) into 1-inch pieces. Place them in a basket and plunge it into a pan containing enough actively boiling salted water (1 level tablespoon of salt to each quart of water) to cover the broccoli. Boil uncovered for 3 minutes. If preferred, the broccoli may be put into a steamer and heated until it is thoroughly wilted. Remove the broccoli and transfer it directly to the hot containers. Pack lightly with a wooden spoon. Add ½ teaspoon of salt to each pint of broccoli, and fill the containers with

boiling water. Seal and process according to the general directions for canning vegetables (page 45).

Cabbage

See *Sauerkraut*, page 54.

Carrots

Can in pint or quart jars or in No. 2 or No. 3 plain tin cans. Process at 10 pounds of pressure: pint, 30 minutes; quart, 35 minutes; No. 2, 30 minutes; No. 3, 30 minutes.

The canning of carrots is not recommended. Carrots can be easily and successfully stored. A freshly cooked stored carrot is a better product than a canned one. It is advisable, therefore, to use time and containers for the canning of more perishable products. If carrots must be canned, use only the very small ones that are thinned out of rows. From 16 to 20 should fit in a pint container. It is not necessary to scrape these small carrots. Wash and brush them thoroughly in cool water. Place them, whole, in a wire basket and plunge it into a pan containing just enough actively boiling salted water (1 level tablespoon of salt to each quart of water) to cover the carrots. Boil for 3 minutes. If preferred, the carrots may be put into a steamer and heated thoroughly instead of being boiled. Remove the basket of carrots and dip it into a pan of cold water for 1 minute, to chill the carrots so that they may be handled easily. Pack them upright in the container, alternating stem and root end. Pack the lower layer completely before beginning the upper one. Fill the containers with the boiling salted water in which the carrots were boiled or, if a milder flavor is preferred, add one teaspoon of salt to each pint of carrots and fill the containers with boiling water. Seal and process according to the general directions for canning vegetables (page 45).

Corn[16]

Can in containers no larger than pint jars or in No. 2 C-enamel tin cans. Process under 15 pounds of pressure. Process, whole grain: pint, 60 minutes; No. 2, 50 minutes. Process, cream style: pint, 75 minutes; No. 2, 70 minutes.

Can only tender, just matured corn, and can it immediately after harvesting. Dry or salt fully matured corn or corn which has stood for any length of time after harvesting. To test for maturity, press the thumb against some of the grains until they burst: if the grains are tender and a thin milk flows from them, the corn is in good condition for canning; if the grains are tough and a thick, starchy liquid comes from them, do not prepare the corn for canning. Corn is one of the most difficult vegetables to can. For successful results: can only small quantities at one time; select and prepare carefully; pack quickly; can in containers holding only about a pint; process immediately after packing; cool promptly; and store carefully.

[16]Refer to the footnote to table 6, page 65.

Corn, whole grain. To husk the corn, cut off the shank of the ear, just grazing the bottom kernels, then remove the husk and the larger part of the silk. Brush the ear with a fairly stiff brush to remove the remainder of the silk. Do not precook the corn, but cut it from the cob at once with a sharp knife. Cut from tip to butt. Do not scrape the cob if whole kernels are desired. Put the corn kernels into a pan, cover them with boiling water, add 1 teaspoon of salt and 2 teaspoons of sugar to each quart of corn, and bring the corn just to the boiling point. Transfer the boiling hot corn and its liquid quickly to hot pint containers. Pack the corn loosely and lightly. Fill the containers only to within ½ inch of the top, in order to allow for the swelling of the corn when it is heated. Stir the contents of the containers with a knife so that any air bubbles will be set free. Seal and process at once according to the general directions for canning vegetables (page 45).

Corn, cream style or Maine style. Proceed as directed for corn, whole grain, but cut off only the tips of the kernels and then scrape the cobs. Corn canned in this way is more subject to spoilage than is whole-kernel corn because the additional time necessary to scrape the ear allows the corn to become warm so that flat sour may start to take place, and, since more starch is present when the corn is prepared this way, the product is more difficult to process. Unless two or more persons work together, it is advisable to can only whole-kernel corn, in which case the cobs may be scraped for soup to be used immediately.

Greens[17]

(Beet tops, chard, dandelion greens, kale, spinach, and the like.)

Can in containers no larger than pint jars or in No. 2 plain tin cans.
Process at 15 pounds of pressure: pint, 60 minutes; No. 2, 55 minutes.

Can only young, crisp, tender, freshly picked greens. Look over the greens and cut off all tough fibrous stems, withered or coarse leaves, and undesirable roots. Wash the greens thoroughly in several changes of lukewarm water. Put the greens into an uncovered pan containing a very small quantity of actively boiling salted water (1 level tablespoon of salt to each quart of water), or into a steamer. Heat for from 2 to 4 minutes or until the main stems are somewhat wilted. Remove the greens and transfer them boiling hot to the hot containers. Pack lightly. If the greens are packed too tightly, spoilage may occur. After the containers are packed, cut through the greens twice from top to bottom in order to permit a freer circulation of liquid. Either fill the containers with the boiling salted liquid in which the greens were boiled, or add ½ teaspoon of salt to each pint of greens and fill the containers with boiling water. Seal and process at once according to the general directions for canning vegetables (page 45).

[17]Refer to the footnote to table 6, page 65.

Mushrooms

Can in pint or quart jars or in No. 2 or No. 3 plain tin cans. Process at 10 pounds of pressure: pint, 25 minutes; quart, 35 minutes; No. 2, 25 minutes; No. 3, 25 minutes.

Not all mushrooms are edible. If wild or uncultivated mushrooms are picked for canning, make certain that they belong to an edible variety. Remove the stem ends and wash the young, freshly gathered mushrooms thoroughly. Drop them immediately into cold water containing 1 tablespoon of vinegar to each quart of water. This tends to prevent discoloration. Place them in a wire basket and plunge it into a pan containing just enough actively boiling salted water (1 level tablespoon of salt to each quart of water) to cover the mushrooms. This water may also contain 1 tablespoon of vinegar to each quart of water, if desired. Boil uncovered for 3 minutes. Remove the mushrooms and transfer them directly to the hot containers. Pack moderately tight but do not press them down. Either fill the containers with the boiling salted water in which the mushrooms were boiled, or add ½ teaspoon of salt to each pint of mushrooms and fill the containers with boiling water. Seal and process at once according to the general directions for canning vegetables (page 45).

Parsnips

Parsnips, like carrots, should be stored. If they must be canned, follow the directions given for canning carrots (page 51).

Peas[18]

Can only in pint jars or in No. 2 C-enamel tin cans. Process at 10 pounds of pressure: pint, 45 minutes; No. 2, 40 minutes.

Can only young and tender peas. Gather them in the early morning while it is still cool. Wash them in cold water immediately after harvesting and shell them at once into shallow pans. Discard all large and overmature peas. Work as quickly as possible, as peas are subject to flat sour and should not be allowed to stand in a warm room. Transfer them to a steamer or to a pan containing enough rapidly boiling salted water (1 level tablespoon of salt to each quart of water) to cover them. Steam until thoroughly heated or boil uncovered for 3 minutes. Remove the peas with a strainer and transfer them directly to the hot containers. Pack them loosely to within ½ inch of the top, then either fill the containers with the boiling salted water in which the peas were boiled or add ½ teaspoon of salt to each pint of peas and fill the containers with boiling water. Add 1 teaspoon of sugar to each pint of peas if additional sweetening is desired. Seal and process at once according to the general directions for canning vegetables (page 45).

Pumpkin[18]

Can in pint or quart jars or in No. 2 or No. 3 R-enamel tin cans. Process at 15 pounds of pressure: pint, 60 minutes; quart, 75 minutes; No. 2 60 minutes; No. 3, 70 minutes.

[18]Refer to the footnote to table 6, page 65.

Pumpkin is easy to store but it is not particularly easy to can. The convenience of having the canned product, however, frequently makes canning worthwhile. Use firm, well-ripened pumpkin. Underripe pumpkin yields an inferior, flavorless product. Wash it, then cut it in halves, cutting from stem to blossom end. A cleaver or a hatchet can be used to advantage. Scoop out the seeds and spongy pulp with a large wooden spoon. Put the halves or smaller pieces into a steamer and steam for from 10 to 15 minutes, or until the pumpkin is tender but not soft. If desired, the pumpkin may be baked instead of steamed. When the pumpkin is cool enough to handle, but is still hot, remove the pulp with a spoon and mix it with enough water to give the consistency of pie filling. If it is not possible to steam or to bake the pumpkin, peel it, cut it into small pieces, and put it into enough actively boiling salted water (1 level tablespoon of salt to each quart of water) to cover. Cook covered until it is just tender. The pumpkin and liquid may be put through a sieve or a colander, but this is not necessary. If the canned product is to be used for pie filling, the favorite seasonings may be added at this point. An amount often used for each quart of pumpkin is: 1 teaspoon of salt, 1 teaspoon of ginger, 2 teaspoons of cinnamon, and ½ cup of brown sugar. Transfer the hot pumpkin to the hot containers. Pack it loosely and lightly, and fill the containers to within ½ inch of the top. Seal and process at once according to the general directions for canning vegetables (page 45).

Rhubarb

See *Fruits,* page 40.

Sauerkraut

Can in pint or quart jars or in No. 2 or No. 3 plain tin cans. Process in a boiling-water bath: pint, 35 minutes; quart, 40 minutes; No. 2, 30 minutes; No. 3, 30 minutes.

It is impractical to can cabbage because it can be easily and successfully stored. Sauerkraut will keep well through the greater part of the winter, but a supply may be canned for late winter and spring use. Can sauerkraut when it is crisp, firm, well-matured and not too acid; can it when it is at the stage which you consider "just right." Pack the cold kraut in the containers lightly, and fill the containers with the sauerkraut brine or with a brine made of 2 level tablespoons of salt to each quart of water. Seal according to the general directions for canning vegetables on page 45. Place the containers in a boiling-water bath and remove the bath from the heat as soon as it comes to a boil again. Allow pint containers to remain in the hot-water bath for 35 minutes and quart containers for 40 minutes. Remove the jars. Seal and cool according to the general directions for canning vegetables (page 45).

Squash[19]

Store, or follow the directions given for canning pumpkin (page 53). The spices are usually omitted and the sugar is reduced to from 1 to 2 tablespoons to each quart of squash.

Succotash[19]

Can in containers no larger than pint jars or in No. 2 C-enamel tin cans. Process at 15 pounds of pressure: pint, 75 minutes; No. 2, 70 minutes.

Prepare the vegetables for canning as given in the detailed directions for each vegetable. Mix lima beans and corn in the proportion of from one-third to one-half beans and from one-half to two-thirds corn. Can as directed for corn (page 51).

Tomatoes

See *Fruits,* page 41.

Tomato juice

See *Fruits,* page 42.

Vegetable mixtures

Can in pint or quart jars or in No. 2 or No. 3 plain tin cans. Process at the pressure and for the time required by that vegetable which, when canned alone, requires the longest processing period.

Any desired mixture of vegetables may be canned together and used later for soup or salad. Prepare each vegetable as if it were to be canned separately. Cut the vegetables into small uniform pieces. When all of them have been prepared, put the vegetables into a small quantity of actively boiling salted water (1 level tablespoon of salt to each quart of water). Boil uncovered for 3 minutes. If separate layers of the different vegetables are desired, boil the vegetables one at a time but use the same salted water for all. Remove the vegetables from the water with a strainer. Pack the hot containers loosely while the vegetables are still hot. Fill the containers with the boiling salted water in which the vegetables were boiled. If the soup mixture contains tomato, water is not necessary. Bring the tomatoes to a boil, then add the other vegetables. Boil for 3 minutes. Pack hot. Seal and process according to the general directions for canning vegetables (page 45).

Suggested combinations, which should be seasoned to taste, are:

Equal parts of carrots, snap beans, peas, corn, and celery. Use three, four, or all five of these.

Equal parts of spinach, carrots, and celery.

One cup each of corn, lima or snap beans, and celery; 1 small sliced onion; 1 chopped green pepper; and a small quantity of minced parsley.

One cup each of corn and lima beans, and 2 cups of peeled, cut tomatoes.

[19]Refer to the footnote to table 6, page 65.

One cup each of corn, lima beans, and peas; 6 cups of peeled cut tomatoes; and 1 small sliced onion.

One cup each of carrots, celery, lima or snap beans, pickling onions, and peas; 2 sliced green peppers; and 1 sliced red pepper. This combination is intended for a salad mixture and should have 2 tablespoons of mild vinegar added to each pint container of the vegetable mixture.

THE CANNING OF MEATS, POULTRY, AND FISH

Meat

Can in pint or quart jars or in No. 2 or No. 3 plain tin cans. Process at 15 pounds of pressure: pint, 55 minutes; quart, 60 minutes; No. 2, 55 minutes; No. 3, 60 minutes.

General directions

Preliminary preparation

The following preliminary preparations are to be made before the day of canning:

1. Read "Carelessness That May Lead to Spoilage" (page 2).

2. Read the recipe for the particular meat to be canned. Locate, examine, and gather together the necessary equipment.

3. Estimate and select the number of containers required (table 3, page 25), then add several extra to provide for an emergency. Provide enough rubber rings or tin lids, with sealing composition or rubber rings attached, for the glass jars.

a. *If glass jars are selected for use:* (1) Examine the jars and lids to see that there are no nicks, cracks, or uneven places where the seal will be made. If no nicks or cracks are evident, run the finger cautiously around the edge of the jar and the lid to detect uneven edges. Test all jars except those that have lids to which a sealing composition is attached. Partly fill each jar with hot water. Place the wet rubber and lid in position and completely seal the jar. Invert the jar and let it stand inverted for at least 5 minutes. If there is a leak, try the lid on a jar already found to be good and try a good lid on the jar just tested, to determine whether the jar or the lid is faulty. Tighten the bail as directed on page 2, if it seems loose. Discard for canning purposes all jars and lids which are defective when this test is applied. Do not apply the water test to jars having lids to which the sealing composition is attached. (2) Wash in hot soapy water all jars, rubbers, and glass lids and rinse them thoroughly in clear hot water. Do not wash metal lids to which the sealing composition is attached but dip them in hot water just before putting them on the jars. *Jars that have had spoiled food in them should receive special attention* because if such jars are not steri-

lized the spoiled food of one year may be the cause of further spoilage a second year. Thoroughly wash the jars and lids and put them into a pressure cooker at 15 pounds of pressure for 15 minutes, or boil the jars and lids for 2 hours in enough actively boiling water to cover them. (3) Test the rubber rings by stretching each ring out twice its length; it should be sufficiently elastic to return to its original size and shape. Double the ring over and press the fold with the fingers; a good rubber will not crack. Do not use rubbers that will not stand both of these tests.

b. *If tin cans are selected for use:* (1) Make certain to use the correct lining by consulting tables 6 and 7 on pages 65 and 66. (2) Wash the tin cans in hot soapy water and rinse them thoroughly in clear hot water. Do not wet the paper gasket-lined tin covers. (3) Test the tin-can sealer by filling one or two cans with water, sealing them, and examining the seal for leaks.

4. Examine the pressure cooker to see that the valve, the pet cock, the pressure gauge, and the thermometer are all in working order. Under no circumstances use a pressure cooker which does not have its valve and pet cock in good condition.

Selection of meat

Any kind of meat, such as beef, veal, mutton, lamb, pork, and venison, or meat sundries, such as heart, liver, tongue, kidneys, and brains, may be canned. With proper equipment and some help, a whole beef may be canned. The meat must be fresh, clean, and from healthy animals; and the animal heat must have entirely left the meat before it is canned. This usually requires 24 hours. Keep the meat cool, but, if possible, do not allow it to freeze if it is to be canned; if frozen meat is canned, it may be dry and stringy.

Preparation of meat

Absolute cleanliness of the operator, the work bench, and the utensils at all times is essential. Wipe the meat carefully with a clean, damp cloth. Do not dip the meat into water because the juices will be drawn out. Cut away all dark portions, excess fat, and cartilage; and remove any bones. Slice the meat across the grain, then cut it into pieces of suitable size for serving. Although the meat may be cooked before canning if desired, it is not necessary. Such pre-cooking of meat is a time-consuming process, and does not shorten the length of time the meat must be processed.

Preparation of meat sundries

Liver

Remove the membrane, soak in salt water (1 teaspoon of salt to each quart of water) for one hour, then cut out the coarse veins, and cut the liver into slices or cubes.

Kidneys[20]

Soak in salt water (1 teaspoon of salt to each quart of water) for one hour, split open, and remove the little sacks.

Heart[20]

Clean and cut in pieces.

Tongue

Soak in salt water (1 teaspoon of salt to each quart of water) for one hour, then wash. If small, leave whole; if large, boil, skin, and cut.

Head

Split, and soak in cold water over night. Remove eyes, ears, brains, mucous membrane, and nostrils. Clean remaining pieces carefully. Use for stew or with liver for headcheese.

Sweetbreads and brains

Clean and soak in several changes of salt water (1 teaspoon of salt to each quart of water) for one hour. Cover with boiling water and allow to stand for 5 minutes. They should be covered with boiling water when they are packed.

Packing the meat

Pack the meat or meat sundries loosely, neatly, and orderly into hot glass jars or plain tin cans. A quart container holds about three pounds of trimmed meat. Allow from 1½ to 2 level teaspoons of salt to each quart of meat. When the container is half packed, add part of the salt; add the other part when the jar is almost filled. A thin piece of fat may be placed on the top piece of meat to prevent it from becoming too dry. Fill the container to within ½ inch from the top. Seasoning such as onion, bay leaf, or anything desired, may be added, and a small piece of bone if there is room. Do not add melted fat, flour, crumbs, meal, and the like, or water. The meat should be cut into pieces, it should not be packed too tightly, and the jar should not be filled entirely to the top because the compact nature of the meat makes it difficult for heat to penetrate quickly to the center of the container. Flour, crumbs, meal, and excess fat are omitted because they also retard the rate at which heat can penetrate. Water is omitted because the flavor of meat canned without water is more like roast than like stew. Enough juice and fat will be extracted from the meat during processing to fill the container at least two-thirds with liquid. The meat will, therefore, shrink somewhat so that the container will not be full; this will not impair the keeping quality of the meat.

[20]Kidneys and heart may be mixed and canned with vegetables for stew.

Sealing, processing, labeling, and cooling

1. Carefully wipe the tops of the jars and the rubber rings, and put the lids in place. Fat or food on the rubber may give an incomplete seal which will result in spoilage.

Clean surfaces to be sealed and adjust lids of containers.

2. Completely seal all glass jars having a non-vent, one-piece screw cover (figure 6) or a wire bail (figure 2). If desired, the latter may be only partially sealed (page 21); to partially seal such jars proceed as follows: If the jar has a wire bail, click the top bail into position, but leave the lower bail up while processing (figure 2). If the jar has a non-vent, one-piece screw top, first screw it in place, then unscrew it half a turn so that it is not tight.

   If tin cans are used, exhaust by allowing them to stand uncovered for 15 minutes in boiling water before sealing them; then completely seal them at once.

3. Place the hot containers in the hot pressure cooker. Glass jars should not touch each other. Tin cans may be either piled on top of each other or placed on their sides.

4. Carefully wipe the cover and the top edges of the pressure cooker. Clamp the cover in place.

Place containers in prepared pressure cooker and process.

5. Process the containers for the length of time required. Allow the pet cock of the pressure cooker to stay open for from 7 to 10 minutes so that all the air is forced out of the cooker before the pressure is allowed to rise, as the required high temperature will be reached only if all the air is driven out. After the pet cock is closed, from 5 to 10 minutes will be needed to reach the desired pressure. *Begin counting the processing time only after the desired pressure is reached. Increase the processing time if the meat is tightly packed, or if the pressure fluctuates.* If the pressure fluctuates, some of the liquid in the jars may be lost.

Allow pressure to fall to zero.

6. At the end of the processing time, remove the cooker from the stove or turn off the heat. If glass jars have been used, be sure to allow the pressure gauge to fall to zero and stay there for 2 minutes before slowly and carefully opening the pet cock. Air should rush in but steam should not rush out. If tin cans are used, the pet cock may be cautiously opened before the pressure gauge reaches zero.

Open cooker and seal jars at once.

7. Remove the cover from the cooker and quickly complete the seal of the jars while they are still in the cooker, unless the seal has already been completed in step 2. The cooker should not be so full that this is impossible.

Remove containers and cool.

8. Remove the containers immediately and cool them promptly. Set glass containers upright and far apart in a well-ventilated but not drafty place. Cool tin cans with running water or by plunging them into several changes of cold water. Prompt cooling is essential if a product of the best flavor, color, and texture is to be obtained. Never store jars or tin cans close together until they are cold. Failure to observe this precaution may result in the spoilage of an entire batch of food.

Wash, label, and store containers.

9. Wash the containers thoroughly, handling the jars carefully in order to avoid breaking the seal. The screw bands on the jars with composition-lined lids (figure 4) may be removed when the jars are cold. These jars belong to the so-called vacuum type and, once cooled after processing, they will remain sealed indefinitely even when the metal band is removed.

10. Label carefully, giving name of products, date, and grade.

11. Store in a cool, clean, dark, well-ventilated place. Avoid steam pipes and furnaces.

12. Read: pages 24 and 25 for scoring the finished products; page 26 for common defects and reasons; page 2 for carelessness that may lead to spoilage; and page 7 for reasons for spoilage.

Meat stock

As all bones and trimmings are removed from the meat, put them into a soup kettle. Slowly simmer until the flesh drops in shreds from the bones and the liquid is so concentrated that it jells when it is cold. Add the seasoning as desired. Skim off excess fat. Strain the stock through four layers of cheesecloth, then bring it to a boil. Transfer it while boiling hot to clean, hot containers, and seal and process as for meat (page 59).

Mincemeat

Mix the following and heat the mixture for one hour, stirring it occasionally:

4 pounds lean, boiled chopped meat
2 pounds finely chopped or ground suet
8 pounds tart, juicy apples

3 chopped quinces
4 pounds cut seeded raisins
2 pounds currants
1 pound finely chopped citron
2 pounds brown sugar
1 quart molasses
2 quarts sweet cider
1 pint meat stock
1 tablespoon salt
2 oranges (juice and peel if desired)
2 lemons (juice and peel if desired)

To the above mixture add:

1 pint to 1 quart grape juice
1 teaspoon pepper
1 tablespoon mace
1 tablespoon allspice
1 tablespoon powdered clove
2 tablespoons cinnamon
2 grated nutmegs

More salt to taste if necessary

Pack boiling hot into hot pint or quart jars. Seal in the usual way. Process for 30 minutes at 10 pounds of pressure or for 60 minutes in a boiling-water bath.

Poultry[21]

Can in pint or quart jars or in No. 2 or No. 3 plain tin cans. Process at 15 pounds pressure: pint, 55 minutes; quart, 60 minutes; No. 2, 55 minutes; No. 3, 60 minutes.

Preliminary preparation

Follow the directions given for meat (page 57).

Preparation of rabbit for canning: Skin; remove entrails; wash in salted water; cut into pieces.

Preparation of game for canning: Follow directions for preparing poultry, as far as possible. Cut in pieces suitable for the container.

Selection of chicken

Can surplus cockerels in the summer and non-laying hens at the culling season if feed costs must be reduced. The best flavored canned product, however, is from poultry at least a year old which is fat rather than very lean. Kill only healthy poultry. Allow it to bleed and to cool thoroughly before canning it; six hours is usually necessary.

[21]Rabbit and game are canned as directed for poultry.

Preparation of chicken

Draw the dressed chicken as for cooking. Remove the lungs. Scrub the skin with a brush and lukewarm suds, using an odorless soap. Rinse thoroughly under running water. Cut the skin between the legs and body, remove the whole legs, and split them at the joint. Cut off the wings and chop off their tips. Remove the oil sac. Cut the meat off the bones. Begin at the breast, cut down around the back and to the neck. Cut as close as possible to the bone, carefully pulling the meat away from the bone with the left hand. Cut into four pieces and wrap each piece in its skin. Usually, the neck is not canned with the meat but is left on the carcass and used for chicken stock. Although the chicken may be cooked before canning if desired, it is unnecessary. Such precooking is a time-consuming process, the flavor resulting from it seems less desirable to most persons, and it cannot decrease the time of processing.

Packing the chicken

Arrange all pieces so that the skin, and not the flesh, touches the container. Put in the drumsticks, fleshy part downward. Place the thighs next to them. Place the two wings next to the thighs, with the tips pointed down, leaving the joint pointing upward so that the wings may be removed from the jar unbroken. If the liver, gizzard, and heart are sweet, as they should be, wrap them in a piece of neck skin and place them in the centre of the jar near the bottom, gizzard first. If several chickens are being canned at one time, these parts may be canned separately if desired. Allow 1½ level teaspoons of salt for a quart of canned chicken; add half of the salt at this point. Fit the remaining pieces in to the best advantage. Cut the non-bony pieces in such a way that there is a piece of skin for each piece of flesh. It is preferable to have a dark piece covered with skin or the neck, if this is canned, on top of the pack, as this meat is naturally more juicy than the white meat and the piece in this position sometimes becomes slightly dry. Add the remainder of the salt just before sealing. Do not add any water. If tin cans are used, exhaust by allowing them to stand uncovered for 10 minutes in boiling water, before they are sealed. A dressed chicken weighing from 3½ to 4 pounds will fill one quart jar if prepared as directed above.

Sealing, processing, labeling, and cooling

Follow the directions given for canning meat (page 59).

Chicken stock

As all bones and trimmings are removed from the chicken, put them into a soup kettle. Slowly simmer and boil down until the liquid is so concentrated that it jells when it is cold. Add seasoning as desired. Skim off

excess fat. Strain the stock through four layers of cheesecloth. Bring it to a boil, and transfer while boiling hot, to clean hot containers. Seal and process as for poultry.

Fish

Can in pint jars or in No. 2 plain tin cans. Process at 15 pounds of pressure: pint, 85 minutes; No. 2, 80 minutes.

Preliminary preparation

Follow the directions given for canning meat (page 57).

Selection of fish

Can only fish of unquestionable freshness. It must be canned no later than 4 or 5 hours after it has been caught. For the best results, use fish which has been killed with a knife and bled well as soon as caught.

Preparation of fish

Remove the head and tail, dip the fish into boiling water, and then scale. If the skin is very tough, remove it. Remove the entrails and the dark membrane which sometimes covers the abdominal cavity. Press the blood out toward the backbone. Remove the backbone of large fish; it is not necessary to do this for small fish. Wash thoroughly. Make flabby fish firm by soaking it in brine which is strong enough to float a potato. Wipe with a dry cloth, and cut into sizes convenient for serving and packing. Although it is not necessary, it may be precooked if desired.

Packing the fish

If the fish has not been skinned, pack so that the skin is next to the container. Add ½ teaspoon of salt to each pint container. Do not add any water. If tin cans are used, exhaust by allowing them to stand uncovered for 10 minutes in boiling water before they are sealed.

Sealing, processing, labeling, and cooling

Follow the directions given for canning meat (page 59).

THE CANNING OF VEGETABLES, MEAT, AND POULTRY IN A BOILING-WATER BATH

Do not use this method if the product is to be sold

(Not recommended. Dry, freeze, pickle, or store vegetables and cure or freeze meats rather than use this method.)

The canning of vegetables, meats, and poultry in a boiling-water bath cannot be recommended because of the possibility of loss by spoilage and the more serious danger of illness caused by eating the spoiled food. Nevertheless, it is well understood that in some homes it may be impossible to obtain a pressure cooker and that there may be a surplus of vegetables, meat,

or poultry, which must be canned in order to provide food for the family for the year. Canning powders and preservatives should never be used, as they are not necessary and they may be harmful. The use of vinegar or lemon juice, formerly recommended in the canning of vegetables by the hot-water-bath method, is not advised because the method is not dependable and the flavor of the product is frequently unsatisfactory. *When the container is opened, remove the food from the can; bring the food to an active boil, and boil it vigorously in an uncovered vessel for 10 minutes before tasting it.* Spoilage will be reduced to a minimum and health will not be endangered *if the accompanying directions are followed exactly:*

1. Read "Carelessness That May Lead to Spoilage" (page 2).
For a complete discussion of spoilage, see page 7.

2. Follow the directions for the preliminary preparations, selection, packing, and sealing of the particular food to be canned.

3. Process, cool, and store as follows:

Place containers in water bath and process.

Lower the hot containers carefully onto the rack in an actively boiling-water bath. Do not allow them to touch each other. See that the water comes 2 inches over the tops of the containers. Cover the water bath. Work must be planned so that the boiling-water bath is always waiting and ready for the food and that the food is never waiting for the water bath.

Process the containers for the length of time indicated on the accompanying time-table. Begin counting the time only when the water comes to a vigorous boil again after the containers have been put into the water bath. The water must be kept at a rapid, steady boil during the entire processing period. Increase the processing time if for any reason the water does not boil constantly, if the vegetables are fully mature, or if the vegetables stood around for several hours before they were canned.

Remove containers in water bath and process.

At the end of the processing period, remove the containers; complete the seal at once if the jars were only partially sealed before processing.

Cool the jars promptly. Set them upright, far apart, and in a well-ventilated but not drafty place. Cool tin cans with running water or by plunging them into several changes of cold water. Prompt cooling is essential if the best flavored and colored product is to be obtained and if flat sour is to be avoided. Never store jars or tin cans close together until they are cold.

Wash, label, and store containers.

Wash the containers thoroughly. Handle the jars carefully so that the seal may not be broken.

Label carefully, giving name, date, and grade.

Store in a cool, clean, dark, well-ventilated place. Avoid steam pipes and furnaces. If glass jars are stored in too light a place, the color of the contents may fade.

See pages 24 and 25 for scoring of the finished product, page 26 for common defects and reasons, and page 2 for carelessness that may lead to spoilage.

4. Read the discussion on spoilage on page 7 in order to be able to recognize suspicious containers and spoiled food.

5. Do not taste the food until it has been boiled for 10 minutes as directed on page 63. Do not taste food which smells unusual. Destroy as directed on page 11.

TIME-TABLES FOR PROCESSING FOOD

A processing time-table is not infallible. It is based upon properly prepared material properly packed and sealed. The time necessary for processing various foods that have been properly prepared, packed, and sealed is given in tables 6 to 9 inclusive.

TABLE 6. TIME-TABLE FOR PROCESSING VEGETABLES AT 10 POUNDS OF PRESSURE

Vegetables	Glass jars		Tin cans		
	Pint	Quart	No. 2	No. 3	Type of tin can
	Minutes of cooking required at 10 pounds of pressure				
Asparagus	30	35	30	30	Plain tin
Beans, baked	40	50	35	40	Plain tin
*Beans, lima	50	(55)	40	(50)	Plain tin or C-enamel
Beans, shell	50	55	40	50	Plain tin or C-enamel
Beans, snap	30	35	25	30	Plain tin or C-enamel
Beets	30	35	30	30	R-enamel
Broccoli	55	60	50	55	Plain tin
Carrots	30	35	30	30	Plain tin
*Corn, cream (15 pounds pressure)	75	..	70	..	C-enamel
*Corn, whole kernel (15 pounds pressure)	60	(70)	50	(65)	C-enamel
*Greens (15 pounds pressure)	60	(70)	55	(60)	Plain tin
Mushrooms	25	35	25	25	Plain tin
Parsnips	35	40	30	30	Plain tin
*Peas	45	(55)	40	(45)	C-enamel
*Pumpkin (15 pounds pressure)	60	75	60	70	R-enamel
Sauerkraut (see page 54)	..	..	..	..	Plain tin
*Squash (15 pounds pressure)	60	75	60	70	R-enamel
*Succotash (15 pounds pressure)	75	(80)	70	(70)	C-enamel
Tomatoes (boiling-water bath)	35	35	30	30	Plain tin or R-enamel
Tomato juice (precooked)	No processing	..	5	5	Plain tin or R-enamel

*The starred vegetables are the ones which are most difficult to can successfully. It is recommended that for these the smaller containers be used by all but the most experienced canners.

TABLE 7. TIME-TABLE FOR PROCESSING COLD-PACKED FRUIT IN THE BOILING-WATER BATH

Fruit	Glass jars	Tin cans	
	Pint and quart*	No. 2 and No. 3	Type of tin can
	Minutes of cooking required		
Apples	15	10	Plain tin
Applesauce (unstrained hot pack)	8	6	Plain tin
Apricots (raw fruit)	20	15 25	Plain tin
Apricots (precooked)	15	15	Plain tin
Berries	18	15	R-enamel
Cherries	25	20	R-enamel
Cranberries (hot pack)	15	15	R-enamel
Fruit juices	..	..	R-enamel
Gooseberries	20	15	R-enamel
Grapes	18	15	R-enamel
Peaches (raw fruit) soft	25	20	Plain tin
firm	35	30	Plain tin
Peaches (precooked)	15	15	Plain tin
Pears (hot pack or precooked)	20	20	Plain tin
Pineapple	30	25	Plain tin
Plums	20	15	R-enamel
Rhubarb (raw fruit)	20	15	R-enamel
Rhubarb (precooked)	5	5	R-enamel
Strawberries (precooked)	5	5	R-enamel
Tomatoes	35	30	Plain tin or R-enamel
Tomato juice (precooked)	No processing	5	Plain tin or R-enamel

*Add 5 minutes to processing time if half-gallon containers are used.

TABLE 8. TIME-TABLE FOR PROCESSING MEAT, POULTRY, AND FISH AT 15 POUNDS OF PRESSURE

Product	Glass jars		Tin cans		Type of tin can
	Pint	Quart	No. 2	No. 3	
	Minutes of cooking required at 15 pounds of pressure				
Meat	55	60	55	60	Plain tin
Poultry	55	60	55	60	Plain tin
Fish	85	..	80	..	Plain tin

TABLE 9. TIME-TABLE FOR PROCESSING VEGETABLES AND MEAT IN A BOILING-WATER BATH

Do not use this method if product is to be sold

(Not recommended. Use only in an emergency. See page 63.)

Vegetables	Glass jars, pint* and quart	Tin cans, No. 2* and No. 3
	Hours	*Hours*
Asparagus	3	2½
Beans, baked	2	2
Beans, lima	3	3
Beans, shell	3	3
Beans, snap	3	2½
Beets (with vinegar)	2	1½
Broccoli	2½	2
Carrots	2	1½
Corn, whole kernel	3½	3
Greens	3	3
Mushrooms	2	2
Parsnips	2	1½
Peas	3	3
Pumpkin	3	2½
Sauerkraut	1½	1
Squash	3	2½
Succotash	3½	3
Tomatoes	35 min.	½
Meat	4	3½
Poultry	4	3½

*Pint jars and No. 2 cans rather than larger containers are advised when the containers must be processed in a boiling-water bath.

WHY AND HOW TO PLAN FOR FRUITS AND VEGETABLES

Value of fruits and vegetables to health

by

HAZEL M. HAUCK

Vegetables and fruits play an important part in keeping our bodies well.[22] Although they furnish some energy, it is for their content of minerals, vitamins, and fiber that they are of most value. The fiber helps to prevent constipation by providing a bulky indigestible residue. The minerals furnish necessary building material for blood, bones, and other tissues, and also help to regulate many body processes. Vitamins are essential for normal growth and good health at all ages. Each vitamin has a specific function to perform in keeping the body well.[23]

Changes in food values through cooking

Since many vegetables and fruits are eaten both raw and cooked, the question naturally arises, "Does the value of the food change during the cooking process?"

[22]For more complete information on the nutritive value of foods, including fruits and vegetables, refer to Cornell Extension Bulletin 71, *Food Value Chart.*

[23]Refer to Cornell Extension Bulletin 289, *Vitamin Chart,* for information on functions and food sources of the vitamins.

Fiber

The fibrous material becomes somewhat more tender during cooking. For persons with oversensitive digestive tracts, this softened fiber is better than that of coarse, raw foods.

Minerals

Since the minerals are soluble in water, part of the mineral matter of the cooked fruits and vegetables will be found in the cooking water. With fruits, usually all the juice is consumed so that there is no loss of mineral matter, but the loss may be appreciable if the water in which vegetables have been cooked or canned is thrown away. To get all the minerals from the vegetable, serve the water in which vegetables have been cooked or canned with the vegetable if possible, or use it in making soups, sauces, or gravies. The homemaker who does not use vegetable waters in these ways must be sure that her food allowance provides a sufficient margin of safety so that the health of her family will not suffer in consequence. The flavor and appearance of canned vegetables is considered by many persons to be superior when freshly boiling salted water is used as the liquid for processing rather than the blanching water. The blanching water may be used for soup or gravy.

Vitamins

Few carefully controlled studies have been made on the vitamin content of canned fruits and vegetables as compared with similar samples tested while fresh, but it is known that some vitamins are not appreciably affected by cooking or canning, whereas others may be dissolved and partially destroyed during these processes. Carotene, which is changed to vitamin A in the body, is not dissolved in water, and is not much affected by ordinary cooking and canning procedures. Hence the green and yellow vegetables, yellow fruits, and tomatoes are still good sources of vitamin A after canning. The B vitamins, thiamin, riboflavin, nicotinic acid, and others, are soluble in water, as is also vitamin C, so that some of these vitamins, as well as the minerals, will be lost if the cooking water is discarded. Some vitamin C is destroyed during cooking or canning. In spite of this loss, however, canned tomatoes, green peas, spinach, and some other vegetables are good sources of vitamin C.

The months for fresh vegetables

During the summer months, if possible, fresh vegetables and fruits should be used entirely. Only when the fresh vegetable and fruit season has passed, should stored, canned, dried, and brined products be used.

In New York State some fresh vegetables may be obtained as early as May and as late as November. During these two months it may be necessary to use some of the preserved products as well; but for the five months

VEGETABLE	METHOD OF PRESERVATION
Asparagus	Can
Beans, snap	Can or salt
Beans, bush lima	Can or dry
Beets	Store, can, brine
Broccoli, sprouting	Can
Brussels sprouts	Store
Cabbage *	Store, kraut
Carrots	Store
Cauliflower	Brine
Celery	Store
Cucumbers	Pickle
Egg plant	
Kale	Can
Kohlrabi	
Lettuce	
Onions, green	
Onions (for bulbs)	Store, pickle
Parsley	
Parsnips	Store
Peas	Can or dry
Peppers	Pickle or brine
Potatoes	Store
Pumpkin, winter	Store
Radishes	
Rhubarb	Can
Rutabaga	Store
Spinach	Can
Spinach, N. Zealand	Can
Squash, summer	
Squash, winter	Store
Sweet corn	Can, dry, salt
Swiss chard	Can
Tomatoes	Can
Turnips	Store

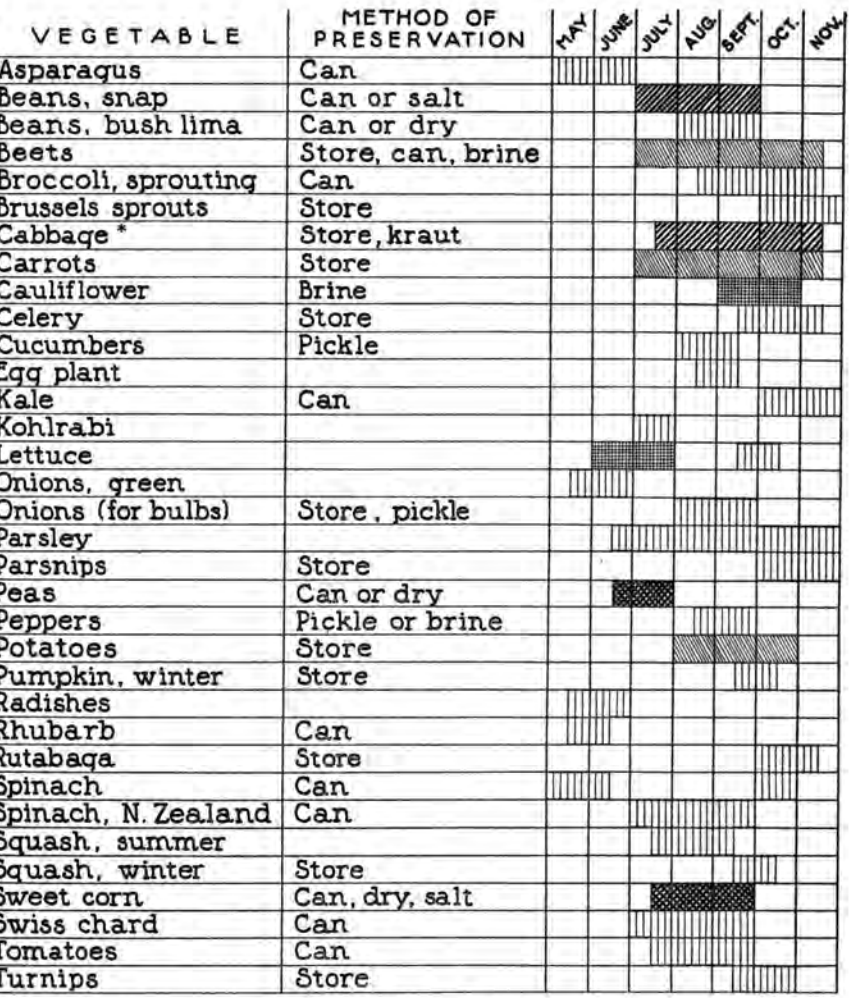

FIGURE 7. MONTHS FOR FRESH VEGETABLES, METHOD OF PRESERVATION, AND NUMBER OF PLANTINGS

TABLE 10. A ONE-YEAR PLAN FOR VEGETABLES, FRUITS, AND MEATS FOR THE FAMILY*

Product	Number of servings weekly†	Approximate amount needed for one person for one year	Approximate amount needed for a family of five for one year‡	Suggested amounts to be stored, canned, dried, brined, cured or frozen for a family of five	Area or quantity needed for a family of five
VEGETABLES:					
Potatoes	7 to 14	3to 4 bushels	15 to 20 bushels	15 to 20 bushels	⅛ acre (5400 square feet)§
Tomatoes	5 to 7	90 pounds	450 pounds or 9 bushels	90 to 100 quarts	60 to 100 plants
Leafy, green, and yellow vegetables	7 or more	156 pounds	780 pounds	520 pounds	¼ acre (10,890 square feet) for 15 to 20 kinds of vegetables including the tomato plants and vegetables selected from those listed in the first column
Suggested distribution:				Suggested distribution:	
Green and leafy vegetables: Asparagus, Beet greens, Broccoli, Brussels sprouts, Chard, Chinese cabbage, Endive, Green peas, Kale, Lettuce, Parsley, Peppers, Snap beans (green), Spinach, Wild greens such as cress, dandelion, marsh marigold, lamb's-quarters, mustard greens, and others	2 to 3 (½ to 1 cup raw vegetable, as chopped spinach or shredded cabbage or carrots, equals 1 serving)	47 pounds	234 pounds	65 to 75 quarts (1 quart of canned vegetables gives from 6 to 8 servings)	
Cabbage	3 to 4	62 pounds	312 pounds	200 pounds to be stored and made into sauerkraut	
Yellow vegetables: Carrots, Rutabagas, Snap beans (wax), Squash, Yellow sweet corn	2 to 3	47 pounds	234 pounds	150 pounds to be stored	

*The material for this chart is adapted from the New York State College of Home Economics series *Food To Keep You Fit*, Leaflet No. 1.

†The suggested servings per week are the minimum to moderate amounts recommended for a good diet. More generous amounts of fruits and vegetables will make the meals nutritionally better.

‡Estimate your family needs by multiplying the amounts needed by one person for one year by the number in your family. Although young children need less, adolescent children may need as much or more. Any extra amounts will allow food for guests or seasonal labor.

§Further details are given in Cornell Extension Bulletin 344, *The Home Garden*, by Arthur J. Pratt. Revised, 1940.

TABLE 10. (*continued*)

Product	Number of servings weekly†	Approximate amount needed for one person for one year	Approximate amount needed for a family of five for one year‡	Suggested amounts to be stored, canned, dried, brined, cured or frozen for a family of five	Area or quantity needed for a family of five
Other fresh vegetables: Beets Cauliflower Celery Corn Cucumbers Eggplant Lima beans Onions Parsnips Radishes Salsify Summer squash Turnips	4 to 7 (½ to 1 cup raw vegetables, as chopped cauliflower, celery, or radishes, equals 1 serving)	100 pounds or 2 to 3 bushels	500 pounds	332 pounds Suggested distribution: 35 to 40 pints corn 10 to 15 quarts beets, and 100 to 125 pounds to be stored	
Dried peas, beans, and the like	1	7 pounds	35 pounds	35 pounds	
FRUITS:	7 or more	150 pounds or 3 bushels	750 pounds or 15 bushels		
Apples	1 medium apple equals 1 serving			6 to 7 bushels (more if desired)	
Berries Cherries Peaches Pears Plums Rhubarb	½ to 1 cup of raw fruit, as berries or sliced peaches, equals 1 serving			70 to 80 quarts (1 quart of canned fruit gives from 6 to 8 servings)	
JELLIES, PRESERVES, AND PICKLES				As desired in addition to the above amount of canned and stored fruits and vegetables	
MEAT, POULTRY, FISH:		150 pounds	750 pounds total, dressed. Use fresh when possible; can, cure, and freeze meat for use during the rest of the year		
Suggested distribution:				Suggested distribution:	
Beef				330 pounds	1 beef—600 pounds liveweight
Veal				92 pounds	1 veal—150 pounds liveweight
Pork				156 pounds	1 pork—200 pounds liveweight
Poultry				140 pounds (drawn)	
Other meat and fish				40 pounds	1 lamb—80 pounds liveweight

*The material for this chart is adapted from the New York State College of Home Economics series *Food To Keep You Fit*, Leaflet No. 1.

†The suggested servings per week are the minimum to moderate amounts recommended for a good diet. More generous amounts of fruits and vegetables will make the meals nutritionally better.

‡Estimate your family needs by multiplying the amounts needed by one person for one year by the number in your family. Although young children need less, adolescent children may need as much or more. Any extra amounts will allow food for guests or seasonal labor.

§Further details are given in Cornell Extension Bulletin 344, *The Home Garden*, by Arthur J Pratt. Revised, 1940.

beginning in June and lasting through October, fresh vegetables are plentiful on the farm and cheap at the market. They should be eaten fresh and in quantity and preserved for winter use. The months during which fresh vegetables are available in New York State are shown in figure 7 (page 69).

A suggested vegetable and fruit budget

by

LINNEA DENNETT AND LOIS P. SHAFER

The suggested vegetable, fruit, and meat budget (table 10, pages 70 and 71) serves as a guide in selecting the kind and quantity of vegetables and fruits it is advisable to use. If more vegetables and fruits than the budget suggests are ordinarily consumed, it is best to continue the good habit; if the quantities and kinds suggested have not been used, plans should be made to use them. Not all of the vegetables and fruits grown in New York are given in table 10; some not listed may be substituted.

Pickles, jams, jellies, and different fruit juices may add zest to the menu.

Let the garden yield the year's vegetable supply[24]

by

C. B. RAYMOND

A well-managed vegetable garden provides vegetables of the best quality in season and also for preservation for the remainder of the year. The cost will be small if thought and care are used in planning.

It is important to have rather definite plans for the garden several weeks in advance of the growing season. The following are some of the items that should be given thought before the frost leaves the ground in the spring.

Location

The garden should be easily accessible to the house and on good soil that is well drained. Large trees are to be avoided, but small trees, bushes, or a hedge will help to prevent wind damage. Above all, the garden must be safe from the damage by livestock.

Size

The home garden should be large enough to provide the family with two kinds of fresh vegetables daily (in addition to potatoes) throughout the growing season and a surplus for the rest of the year of all vegetables that are suitable for storing, drying, brining, freezing, or canning. From one-eighth to one-half acre or even more can be put profitably into a garden, the size depending on the number in the family.

[24]For further information refer to Cornell Extension Bulletin 344, *The Home Garden*, by Arthur J. Pratt. Revised 1940.

Preparation of the soil

The garden should be plowed and fitted as early in the spring as the soil can be worked to advantage. Time spent in thorough preparation of a good seedbed will be saved in labor of cultivating. An hour of shallow cultivation when the weeds are just starting will be worth more than a full day after the weeds are 3 inches tall.

The quality, as well as the yield, of many garden crops depends on sufficient fertility for rapid growth. Farm gardens should be fertilized with well-rotted manure, at the rate of at least 20 loads to the acre (1 load for each 2000 square feet). This should be supplemented with 20-per-cent superphosphate at the rate of 50 pounds to the load or to each 2000 square feet of soil. If stable manure is not available, a complete fertilizer, such as 10–20–10, should be worked into the soil at the rate of 2½ pounds for each 100 square feet of garden.

What shall be grown?

Making a list of the crops to be grown, the varieties of each, the length of row wanted, the quantity of each kind of seed that will be needed, and where the seed is to be obtained, adds to the efficiency and the value of the garden. Not all crops should be planted in any garden, but everyone should have all that can be used fresh and that will be needed during the winter.

When to plant and how

A well-thought-out garden plan will include information on the proper time to start each crop. This in turn is sure to result in getting the benefit of the maximum harvest season of each vegetable. The distance between rows may be great enough to allow for horse cultivation, but it is often more efficient (as shown by a survey of 172 farm gardens) to plant all small-growing crops in rows from 12 to 18 inches apart, using a hand cultivator or a hoe, than to have rows far apart and attempt to keep the crop clean with a horse cultivator. The growing of all the crops for a family of five requires about one-fourth of an acre if the minimum length of row is allowed for each member of the family.

If space is limited, the distance between rows may be reduced to 12 inches for some of the small crops and not more than 24 or 30 inches for others. Too deep sowing of seed coupled with the crowding of plants in the row causes many disappointments.

RELATED BULLETINS

The following bulletins are published by the New York State Colleges of Agriculture and Home Economics. These publications are available on request by addressing the Office of Publications, New York State College of Agriculture, Cornell University, Ithaca, New York.

Food-value chart. Compiled from various sources. Cornell Extension Bulletin 71. Revised 1940.

Low-cost food for health. By Mary Henry and Day Monroe. Cornell Extension Bulletin 236. Revised 1935.

It pays to buy food wisely. By Day Monroe and Mary Henry. Cornell Extension Bulletin 237. 1932.

Curing meats. By R. B. Hinman, C. D. Schutt and H. A. Holley. Cornell Extension Bulletin 241. Revised 1940.

Pickles and relishes. By Marion C. Pfund. Cornell Extension Bulletin 294. Revised 1940.

Vitamin chart. Cornell Extension Bulletin 289. Revised 1940.

Feeding pre-school children. By Helen Monsch and Dora Sonnenday. Cornell Extension Bulletin 351. Revised 1938.

What foods to eat and why. By Anne R. Matthews and Therese E. Wood. Cornell Junior Extension Bulletin 58. Revised 1941.

Eat Apples. Compiled by Mary G. Phillips. Cornell Extension Bulletin 452. 1940.

How to control your weight. By Hazel M. Hauck. Cornell Extension Bulletin 329. 1935.

Feeding babies and mothers of babies. By Helen Monsch. Cornell Extension Bulletion 300. 1934.

The home garden. By Arthur J. Pratt. Cornell Extension Bulletin 344. Revised 1940.

The control of diseases and insects affecting vegetable crops. Cornell Extension Bulletin 206. Revised 1939.

For circulars or information on the growing or storage of other garden vegetables, address the Department of Vegetable Crops, Cornell University, Ithaca, New York.

The following bulletins are published by the New York State Agricultural Experiment Station. These publications are available on request by addressing the Office of Publication, New York State Experiment Station, Geneva, New York.

Preparation of tomato products. By Carl S. Pederson. New York State (Geneva) Agricultural Experiment Station Circular 178. 1937.

Cherry juice and cherry beverages. By Donald K. Tressler. New York State (Geneva) Agricultural Experiment Station Circular 180. 1938.

The pasteurization of apple juice. By Donald K. Tressler and Carl S. Pederson. New York State (Geneva) Agricultural Experiment Station Circular 181. 1938.

Freezing and storage of foods in freezing cabinets and locker plants. By D. K. Tressler and C. W. DuBois. New York State (Geneva) Agricultural Experiment Station Bulletin 690. 1940.

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